Product Selection Guide 195

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

Celwave places the highest degree of emphasis on developing personal partnerships with our customers. We have positioned ourselves to be a significant contributor to the future of telecommunications through astute acquisitions, superior technology and complete product reliability. Regardless of the application, we are determined to totally assure a system's integrity anywhere in the world.

*NASHVILLE 9002 COMPLIANT

WELCOME TO YOUR CELWAVE PRODUCT SELECTION GUIDE.

This guide has been designed to simplify the identification and selection of the large number of products it contains. Following are some catalog features that make it easier to select the right product for your application.

Technical data and reference material to help you select the right product and understand the many variables affecting your communications system. Page 290-309

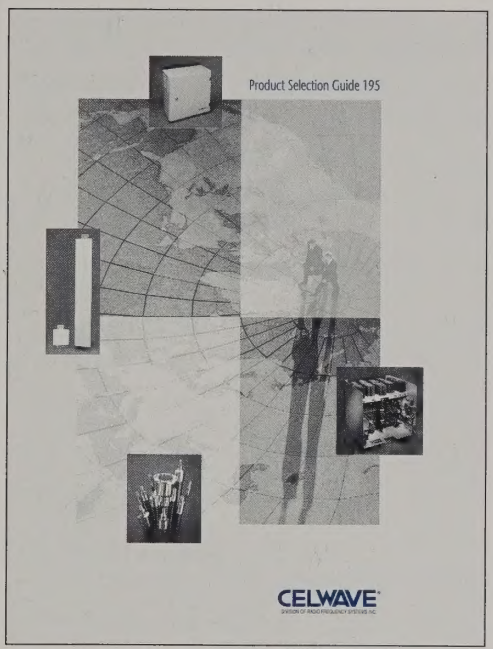
Thumb tab on right side of page to quickly locate product sections.

Quick reference frequency bar at the top of all product pages.

Index A: By product type/frequency. Page 310-317
Index B: By alpha/numeric model number. Page 318-320

PRICE LIST

Effective January 1, 1996



Product Selection Guide, Catalog 195

Antenna Products

Transmission Line

Bi Directional Amplifiers

Cavities, Filters, Duplexers

Receiver Multicouplers

Combining Products and System Components

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.
2 Ryan Road
Marlboro, NJ 07746-1899
Phone: 1-800-321-4700 • FAX: 615-641-1910

The information and prices presented in this document are subject to change without notice. All information is believed to be accurate at the time of publication, but Celwave shall not be held responsible for print or typographic errors.

How to contact Celwave

To place an order:

U.S. and Canada
Telephone:
1-800-321-4700
FAX: 1-615-641-1910

International:
Telephone:
1-602-252-8058
FAX: 1-602-256-2632

Technical Support:
Telephone:
1-800-659-1880
FAX: 1-908-462-6919

The following information is required when placing an order:

Antenna Products

Base Station, Mobile and Portable Antennas:
- Provide frequency or frequency band
- Check catalog to comply with bandwidth constraints

Penetrator
- Provide downtilt when non-standard or when ordering Option-J, Option L or J-Cables

Cavities/Filters/Duplexers

Bandpass Cavity
- Frequency (specified by item group)
- Insertion loss

Bandpass Filters
- Provide reject frequency

Notch Cavity
- Provide reject frequency
- Beginning and end frequencies

Pass-Reject Cavity
- Pass frequency
- Reject frequency
- Check Tx/Rx spacing (per catalog specified minimum spacing)

Duplexers
- Transmit frequency
- Check frequency
- Check Tx/Rx spacing (per catalog specified minimum spacing)

RMC Products

Receiver Multicouplers
- Beginning and end frequencies
- Check bandwidth constraints
- Number of channels, must not exceed the number of RMC ports
- Specify power source (12VDC, 24VDC, 120VAC or 220VAC)

Combiner Products

Combiners
- Exact Tx frequency of each channel
- Check Tx/Rx spacing (per catalog specified minimum spacing)

Combiner Expansion Harness
- New and existing frequencies
- Check combiner minimum spacing (per catalog)

Bi-Directional Amplifiers

BDA's
- Specify beginning and end frequencies for narrow band models
- (48561) Specify "N" for wall mount units

System Products

Systems
- Specify Tx/Rx frequencies where applicable

Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
023376004	148	25-40	Power Divider Harness 25-40 MHz	97.00	
023376005	148	40-60	Power Divider Harness 40-60 MHz	97.00	
023376006	148	50-80	Power Divider Harness 50-80 MHz	97.00	
023376007	148	65-110	Power Divider Harness 65-110 MHz	97.00	
023376008	148	75-115	Power Divider Harness 75-115 MHz	97.00	
023376009	148	90-150	Power Divider Harness 90-150 MHz	97.00	
023376010	148	110-180	Power Divider Harness 110-180 MHz	97.00	
023376011	148	140-210	Power Divider Harness 140-210 MHz	97.00	
023376012	148	150-255	Power Divider Harness 150-255 MHz	97.00	
023376013	148	185-305	Power Divider Harness 185-305 MHz	97.00	
023376014	148	265-305	Power Divider Harness 265-305 MHz	97.00	
023376015	148	345-400	Power Divider Harness 345-400 MHz	97.00	
032119900	18		Glass Advantage N Male Connector	7.00	
044855900	289		Caster Kit	90.00	
048187000	233		Power Supply 240 VAC	630.00	
048210000	233		Power Supply 120 VAC	630.00	
14A0014002	18		Glass Advantage Mini UHF Connector	3.00	
14A0067	18		Glass Advantage TNC Male Connector	5.00	
19A0130002	18		Glass Advantage PL259 Connector	5.00	
42008	18	806-896	Glass Advantage Coupler Box Assy	33.00	Standard Freq. Stocked
42020	18		Glass Advantage Cable Assy	14.00	
42022	18	806-896	Glass Advantage Whip Assy	14.00	Standard Freq. Stocked
42055	18		Glass Advantage Base Assy	15.00	Standard Freq. Stocked
42201	18	806-896	Glass Advantage Base & Whip Assy	22.00	Standard Freq. Stocked
42403	18		Glass Advantage Re-Install Kit	4.00	Standard Freq. Stocked
428850	18	870-960	Glass Advantage Coupler Box Assy	33.00	
43096	18	70-960	Glass Advantage Base & Whip Assy	22.00	
48510	265-270	806-869	BDA, Rack Mount	15204.00	
48510-N	265-270	806-869	BDA, Wall Mount	13892.00	Stocked
48511	265-270	806-869	BDA, Rack Mount	14503.00	
48511-N	265-270	806-869	BDA, Wall Mount	15064.00	
48543	265-270	835-894	BDA, B Band W/Ext. Rack Mnt	15204.00	
48543-N	265-270	835-894	BDA, B Band W/Ext. Wall Mount	15766.00	Stocked
48544	265-270	835-894	BDA, B Band W/Ext. Rack Mnt. 24VDC	14503.00	
48544-N	265-270	835-894	BDA, B Band W/Ext. Wall Mnt. 24VDC	15064.00	
48548	265-270	824-894	BDA, Full Cellular Rack Mount	14756.00	
48549-N	265-270	824-891.5	BDA, A Band W/Notch Tx	16317.00	
48550-N	265-270	824-891.5	BDA, A Band Enhanced	20396.00	
48551-N	265-270	835-894	BDA, B Band Enhanced	20396.00	Stocked
48552-N	265-270	824-891.5	BDA, A Band Enhanced 24V	20396.00	
48553-N	265-270	835-894	BDA, B Band Enhanced 24V	20066.00	
48561	265-270	806-869	BDA, 5 MHz Rack Mount	15094.00	
48561-N	265-270	806-869	BDA, 5 MHz Wall Mount	13892.00	
48566-N	265-270	821-869	BDA, 3 MHz Wall Mount	14112.00	

Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
48569	265-270	806-861	BDA, 10 MHz Rack Mount	14950.00	
48569-N	265-270	806-861	BDA, 10 MHz Wall Mount	13892.00	
48610	NL	824-894	BDA, Microcell	4784.00	
507370	286	66-1000	Guardian PMA 4Ax5T/2Ax10T	4726.00	
514542-001	157		Adapter Kit Round Member 1" - 2"	22.50	
514542-002	157		Adapter Kit Round Member 2" - 3"	25.00	
514542-003	157		Adapter Kit Round Member 3" - 4"	28.50	
514542-004	157		Adapter Kit Round Member 4" - 5"	29.50	
514542-005	157		Adapter Kit Round Member 5" - 6"	31.00	
514542-006	157		Adapter Kit Round Member 6" - 7"	32.00	
514608-003	157		Ceiling Adapter 3/8-16 X 12	16.00	
514608-007	157		Ceiling Adapter 1/4-20 X 12	15.50	
5BSR3A *P*	NL	850-940	Five 3 dB Gain, 220° Cardioid	5513.00	
5BSR3A-8A *P*	NL	850-940	Five 3 dB + One 8 dB 220° Cardioid	85.00	
5BSR3B *P*	NL	850-940	Five 3 dB Gain, 140° Cardioid	5513.00	
5BSR3B-8B *P*	NL	850-940	Five 3 dB + One 8 dB 140° Cardioid	6885.00	
5BSR3C *P*	NL	850-940	Five 3 dB, 60° Sector	5513.00	
5BSR3C-8C *P*	NL	850-940	Five 3 dB + One 8 dB, 60° Sector	6885.00	
5BSR3H *P*	NL	850-940	Five 3 dB Gain, Peanut	5513.00	
5BSR3H-8H *P*	NL	850-940	Five 3 dB + One 8 dB Gain, Peanut	6885.00	
5BSR3O *P*	NL	850-940	Five 3 dB Gain, Omni	5513.00	
5BSR3O-8O *P*	NL	850-940	Five 3 dB + One 8 dB Gain, Omni	6885.00	
719110	277-278	220-222	220 MHz Trunking System	16300.00	
719650	277-278	220-222	5 Ch. Trunking Sys. Separate Tx/Rx	16270.00	
719870	277-278	220-222	10 Channel Trunking Sys., Duplexed	29789.00	
734701-000	162		Type N Male Conn., /LLFLEX 1/2	36.50	Stocked
734710-000	162		Type N Female Conn., /LLFLEX 1/2	38.00	Stocked
734761-000	162		N-Male Conn., 3/8" Radiating Cable	35.20	
734762-000	162		N-Female Conn., 3/8" Rad. Cable	35.20	
734769-000	162		N-Male Conn., 1/4" LLFLEX	14.50	Stocked
734770-000	162		N-Female Conn., 1/4" LLFLEX	46.00	Stocked
734771-000	162		SMA Male Conn., 1/4" LLFLEX	34.00	
734772-000	162		SMA Female Conn., 1/4" LLFLEX	36.00	
734773-000	162		UHF Male Conn., 3/8" Rad. Cable	44.00	
734774-000	162		UHF Female Conn., 3/8" Rad. Cable	44.00	
734779-000	162		N-Male Conn., Low VSWR 1/4" LLFLEX		Contact Sales for Pricing
734780-000	162		N-Female Conn. Lo VSWR 1/4" LLFLEX		Contact Sales for Pricing
738200-000	162		N-Male Connector 1/2" Air	118.70	
738201-000	162		N-Female Connector 1/2" Air	118.70	
738204-000	162		Splice 1/2" Air	230.00	
738225-000	162		N-Male Connector 7/8" Air	118.00	
738226-000	162		N-Female Connector 7/8" Air	118.00	
738229-000	162		EIA 7/8"(GB) 7/8" Air	190.00	
738230-000	162		EIA 7/8"(GP) 7/8" Air	128.00	

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
738231-000	162		Splice 7/8" Air	150.00	
738232-000	162		End Terminal 7/8" Air	262.00	
738300-000	162		N-Male Connector 1-5/8" Air	240.00	
738301-000	162		N-Female Connector 1-5/8" Air	240.00	
738303-000	162		EIA 1-5/8" (GB) 1-5/8" Air	300.00	
738304-000	162		EIA 7/8" Reducer (GB) 1-5/8" Air	345.00	
738305-000	162		Splice 1-5/8" Air	375.00	
738306-000	162		End Terminal 1-5/8" Air	440.00	
738311-000	162		EIA 7/8" Reducer (GP) 1-5/8" Air	300.00	
738314-000	162		EIA 1-5/8" (GP) 1-5/8" Air	260.00	
738350-000	162		EIA 3-1/8" (GB) 3" Air	465.00	
738352-000	162		Splice 3" Air	580.00	
738355-000	162		EIA 3-1/8" (GP) 3" Air	440.00	
738801-000	162		Type N Female Connector 1/2" FLC	31.70	Stocked
738802-000	162		Type N Male Connector 1/2" FLC	31.70	Stocked
738803-000	162		UHF Female Connector 1/2" FLC	28.20	Stocked
738804-000	162		UHF Male Connector 1/2" FLC	27.35	Stocked
738806-000	162		Splice 1/2" FLC	90.00	
738807-000	162		EIA 7/8" (GP) 1/2" FLC	112.00	
738835-000	162		LC Male Connector 7/8" FLC		Contact Sales for Pricing
738841-000	162		Type N Male Connector 7/8" FLC	77.00	Stocked
738842-000	162		Type N Female Connector 7/8" FLC	77.00	Stocked
738843-000	162		UHF Male Connector 7/8" FLC	73.00	Stocked
738844-000	162		UHF Female Connector 7/8" FLC	74.00	Stocked
738845-000	162		EIA 7/8" (GP) 7/8" FLC	116.00	Stocked
738846-000	162		Splice 7/8" FLC	130.00	Stocked
738847-000	162		End Terminal 7/8" FLC	150.00	
738850-000	162		Type N Male Connector 1-5/8" FLC	237.43	
738851-000	162		Type N Female Connector 1-5/8" FLC	237.43	Stocked
738853-000	162		EIA 1-5/8" (GP) 1-5/8" FLC	282.00	
738854-000	162		EIA 7/8" (GP) 1-5/8" FLC	315.00	
738855-000	162		Splice 1-5/8" FLC	365.00	
738880-000	162		EIA 7/8" (GP) 1-1/4" FLC	220.00	
738881-000	162		EIA 1-5/8" (GP) 1-1/4" FLC	220.00	
738882-000	162		Type N Male Connector 1-1/4" FLC	124.57	
738883-000	162		Type N Female Connector 1-1/4" FLC	124.57	Stocked
738885-000	162		Splice 1-1/4" FLC	240.00	
738888-000	162		Type N Male (GP) Conn. 1-1/4" FLC		Contact Sales for Pricing
738889-000	162		Type N Female(GP) Conn. 1-1/4" FLC		Contact Sales for Pricing
810901-001	160-161		1/2" Flexwell Air, HCC12-50J	4.06	
810903-001	160-161		1-5/8" Flexwell Air, HCC158-50J	16.22	
810905-001	160-161		3" Flexwell Air, HCC300-50J	29.12	
810916-001	160-161		1-1/4" Cellflex Foam, FLC114-50J	10.94	Stocked
810916-007	160-161		1-1/4" Fire Retardant, Foam Cable	13.78	

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
810918-001	160-161		1/2" Cellflex Foam, FLC12-50J	2.50	Stocked
810918-007	160-161		1/2" Fire Retardant, Foam Cable	2.66	Stocked
810920-001	160-161		1-5/8" Cellflex Foam, FLC158-50J	14.87	Stocked
810920-007	160-161		1-5/8" Fire Retardant, Foam Cable	17.89	
810921-001	160-161		7/8" Cellflex Foam, FLC78-50J	6.18	Stocked
810921-007	160-161		7/8" Fire Retardant, Foam Cable	8.01	
810929-001	160-161		7/8" Flexwell Air, HCC78-50J	7.54	
811026-001	160-161		1/2" LLFLEX, HCF12-50J CU2Y Cable	3.62	
811028-001	160-161		1/4" LLFLEX, 14-50J CU2Y Cable	1.66	
811032-003	160-161		R-FLC38-50JFR Foam Radiating Cable	3.50	
811032-007	160-161		R-FLC38-50JFRT Radiating Cable	4.45	
811033-003	160-161		R1-FLC12-50JFR Foam Rad. Cable	4.20	
811033-007	160-161		R1-FLC12-50JFRT Radiating Cable	5.20	
811036-003	160-161		R-FLC78-50JFR Foam Radiating Cable	8.30	
811036-007	160-161		R-FLC78-50JFRT Radiating Cable	10.80	
811037-003	160-161		R-FLC114-50JFR Foam Rad. Cable	14.30	
811037-007	160-161		R-FLC114-50JFRT Radiating Cable	17.00	
811038-003	160-161		R-FLC158-50JFR Foam Rad. Cable	19.20	
811038-007	160-161		R-FLC158-50JFRT Radiating Cable	21.60	
811041-003	160-161		R-FLC14-50JFR Foam Radiating Cable	2.75	
811041-007	160-161		R-FLC14-50JFRT Radiating Cable	3.70	
910061-000	156		Straptite Kit 100'	53.00	
910303-000	157		Cable Hoisting Grip 1/2"	29.00	Stocked
910307-000	157		Cable Hoisting Grip 7/8"	43.50	Stocked
910311-000	157		Cable Hoist Grip 1-1/4" & 1-5/8"	51.00	Stocked
915158-000	157		Cable Hoisting Kit, 1-5/8"	47.00	
915620-008	159		Self Lock Hanger 1/4" Cable/Pkg.10	10.50	
915620-010	159		Self Lock Hanger 3/8" Cable/Pkg.10	10.50	
915620-015	159		Self Lock Hanger 1/2" Cable/Pkg.10	11.70	
915620-025	159		Self Lock Hanger 7/8" Cable/Pkg.10	18.00	
915620-036	159		Self Lock Hang 1-1/4" Cable/Pkg.10	29.00	
915620-047	159		Self Lock Hang 1-5/8" Cable/Pkg.10	34.00	
915622-000	159		2" Standoff Kit / Pkg. 10	21.00	
915624-000	159		Flange Insert / Pkg. 10	6.50	
915626-000	159		Adapter Hardware 1/4"-3/8"/ Pkg.10	22.00	
915628-000	159		Threaded Stud / Pkg. 10	8.50	
915630-000	159		Strut Adapter Kit / Pkg. 10	38.00	
915870-003	NL		Cable Grounding Kit 1/2" FLC	24.00	Stocked
915870-005	NL		Cable Grounding Kit 7/8" FLC	30.00	Stocked
915870-007	NL		Cable Grounding Kit 1-1/4" FLC	31.00	Stocked
915870-008	NL		Cable Grounding Kit 1-5/8" FLC	31.00	Stocked
915870-009	NL		Cable Grounding Kit 3" HCC	34.00	
915870-013	NL		Cable Grounding Kit 1/2" LLFlex	24.00	
920150-001	157		Insulated Hangers 1/2" FLC	23.50	

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
920150-002	157		Insulated Hangers 7/8" FLC	23.50	
920159-003	157		Non-Ins. Cable Hanger Slot 1-5/8"	41.00	Stocked
920161-003	157		Insulated Hangers 1-5/8"	39.00	
920161-009	157		Insulated Hangers 1-1/4"	34.00	
920167-001	157		Angle Member Adapter Kit 1/2"	66.00	
920167-004	157		Angle Member Adpt. Kit 7/8"-3-1/8"	64.00	Stocked
920241-000	158		Adapter, EIA to N-Female 7/8"	110.00	
920242-000	158		Adapter, EIA to N-Female 1-5/8"	195.00	
920243-000	158		Adapter, EIA to N-Female 3-1/8"	310.00	
920244-000	158		Adapter, EIA to LC-Female 7/8"		Contact Sales for Pricing
920245-000	158		Adapter, EIA to LC-Female 1-5/8"	205.00	
920246-000	158		Adapter, EIA to LC-Female 3-1/8"	680.00	
920247-000	158		Plate Reducer 1-5/8" - 7/8"	200.00	
920248-000	158		Plate Reducer 3-1/8" - 1-5/8"	242.00	
920249-000	158		Taper Reducer 1-5/8" - 7/8"	127.00	
920250-000	158		Taper Reducer 3-1/8" - 1-5/8"	210.00	
920272-000	158		Hardware Set 7/8" 3/Per	4.00	
920273-000	158		Hardware Set 1-5/8" 4/Per	8.00	
920274-000	158		Hardware Set 3-1/8" 6/Per	10.00	
920275-000	158		Hardware Set 6-1/8" 12/Per	20.00	
920432-002	157		Wall/Roof Feed Through 1/2"	51.50	
920433-000	157		Wall/Roof Feed Through 7/8"	52.50	Stocked
920434-000	157		Wall/Roof Feed Through 1-5/8"	75.00	
920691-003	157		Non-Ins. Cable Hangers 1-5/8"	41.00	
920867-000	157		Wall/Roof Feed Through 1-1/4"	63.00	
920981-004	157		Cable Hanger Non-Ins., Round 1-1/4	41.00	
920981-007	157		Non-Ins. Cable Hangers Slot 7/8"	41.00	Stocked
920981-010	157		Non-Ins. Cable Hangers 3/8", 1/2"	31.00	Stocked
926222-000	158		Hardware Set 4-1/16" 8/Per	14.00	
926285-000	158		Hardware Set 9-3/16" 20/Per	38.00	
A8A/B8A-B1 *P*	NL	UHF+8or900	Dual Band 8 dB UHF + 8 dB 800 220°	6611.00	
A8B/B8B-B1 *P*	NL	UHF+8or900	Dual Band 8 dB UHF + 8 dB 800 140°	6611.00	
A8O/B8O-B1 *P*	NL	UHF+8or900	Dual Band 8 dB UHF + 8 dB 800 Omni	6611.00	
AC90555-2	NL	872-960	Combination Omni Antenna	4000.00	
AF070-T	NL	66-88	2nd Harmonic Filter, Tunable	89.00	
AF150-T	NL	136-174	2nd Harmonic Filter, Tunable	89.00	
AF460-T	NL	406-512	2nd Harmonic Filter, Tunable	85.00	
AF800-T	NL	856-880	2nd Harmonic Filter, Tunable	83.00	
AF900-T	NL	930-960	2nd Harmonic Filter, Tunable	83.00	
AGR6-A-B1AG *P*	75	406-420	8.3 dB Gain, 220° Cardioid	3933.00	
AGR6-B-B1AG *P*	75	406-420	10 dB Gain, 140° Cardioid	3933.00	
AGR6-O-B1AG *P*	75	406-420	6 dB Gain, Omni	3933.00	
AGR8-A-B1AG *P*	75	406-420	10.3 dB Gain, 220° Cardioid	4261.00	
AGR8-B-B1AG *P*	75	406-420	12 dB Gain, 140° Cardioid	4261.00	

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
AGR8-O-B1AG *P*	75	406-420	8 dB Gain, Omni	4261.00	
AGR9-A-B1AG *P*	75	406-420	11.3 dB Gain, 220° Cardioid	4590.00	
AGR9-B-B1AG *P*	75	406-420	13 dB Gain, 140° Cardioid	4590.00	
AGR9-O-B1AG *P*	75	406-420	9 dB Gain, Omni	4590.00	
AHR10-A-B1 *P*	75	470-512	12.3 dB Gain, 220° Cardioid	4590.00	
AHR10-B-B1 *P*	75	470-512	14 dB Gain, 140° Cardioid	4590.00	
AHR10-O-B1 *P*	75	470-512	10 dB Gain, Omni	4590.00	
AHR6-A-B1 *P*	75	470-512	8.3 dB Gain, 220° Cardioid	3933.00	
AHR6-B-B1 *P*	75	470-512	10 dB Gain, 140° Cardioid	3933.00	
AHR6-O-B1 *P*	75	470-512	6 dB Gain, Omni	3933.00	
AHR8-A-B1 *P*	75	470-512	10.3 dB Gain, 220° Cardioid	4261.00	
AHR8-B-B1 *P*	75	470-512	12 dB Gain, 140° Cardioid	4261.00	
AHR8-O-B1 *P*	75	470-512	8 dB Gain, Omni	4261.00	
AHR8A/6A-B1 *P*	75	470-512	Dual 10.3 + 8.3 dB, 220° Cardioid	5288.00	
AHR8B/6B-B1 *P*	75	470-512	Dual 12 + 10 dB, 140° Cardioid	5288.00	
AHR8O/6O-B1 *P*	75	470-512	Dual 8 + 6 dB Gain, Omni	5288.00	
AL001	NL	25-1000	Load Termination, 1 Watt	15.00	Standard Freq. Stocked
AL005	NL	25-1000	Load Termination, 5 Watt	32.00	Standard Freq. Stocked
AL015	NL	25-1000	Load Termination, 15 Watt	43.00	Standard Freq. Stocked
AL030	NL	25-1000	Load Termination, 30 Watt	80.00	Standard Freq. Stocked
ALR10-A-B1 *P*	76	450-482	12.3 dB Gain, 220° Cardioid	4590.00	
ALR10-B-B1 *P*	76	450-482	14 dB Gain, 140° Cardioid	4590.00	
ALR10-O-B1 *P*	76	450-482	10 dB Gain, Omni	4590.00	
ALR6-A-B1*P*	76	450-482	8.3 dB Gain, 220° Cardioid	3933.00	
ALR6-B-B1 *P*	76	450-482	10 dB Gain, 140° Cardioid	3933.00	
ALR6-O-B1*P*	76	450-482	6 dB Gain, Omni	3933.00	
ALR8-A-B1 *P*	76	450-482	10.3 dB Gain, 220° Cardioid	4261.00	
ALR8-B-B1 *P*	76	450-482	12 dB Gain, 140° Cardioid	4261.00	
ALR8-O-B1 *P*	76	450-482	8 dB Gain, Omni	4261.00	
ALR8A/6A-B1 *P*	76	450-482	Dual 10.3 + 8.3 dB, 220° Cardioid	5288.00	
ALR8B/6B-B1 *P*	76	450-482	Dual 12 + 10 dB, 140° Cardioid	5288.00	
ALR8O/6O-B1 *P*	76	450-482	Dual 8 + 6 dB Gain, Omni	5288.00	
AO1803	129-130	1710-1880	Omni, 3 dBd Gain	266.00	
AO1809	131-132	1710-1880	Omni, 9 dBd Gain, DCS 1800	1200.00	
AO1810	131-132	1710-1880	Omnidirectional, 9.5 dB Gain, PCS	1060.00	
AO1903	129-130	1850-1990	Omni, 3 dBd Gain	266.00	
AO1909	131-132	1850-1970	Omni, 9 dBd Gain, PCS	1200.00	
AO8410	91-92	806-869	Omnidirectional Broadband, 10 dB	1920.00	Stocked
AO8610	91-92	824-894	Omnidirectional Broadband, 10 dB	1920.00	Stocked
AO9009-2	93	890-960	Omni, 9 dBd Gain Collinear Antenna	1400.00	
AO9210	91-92	870-960	Omnidirectional Broadband, 10 dB	1920.00	
AP181213-2	139-140	1710-1990	Panel, 120°, 13 dB, W/Tilt Mnt.	783.00	
AP181213-4	139-140	1710-1990	Panel, 120°, 13 dB, W/Fixed Mnt	683.00	
AP183312-4	133-134	1710-1990	Panel, 33°, 12 dB, W/Fixed Mnt.	473.00	

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AP183315-4	133-134	1710-1990	Panel, 33°, 15 dB, W/Fixed Mnt.	858.00	
AP183317-2	133-134	1710-1990	Panel, 33°, 17 dB, W/Tilt Mnt.	1010.00	
AP183317-4	133-134	1710-1990	Panel, 33°, 17 dB, W/Fixed Mnt.	910.00	
AP186010	NL	1710-1880	Panel, 60°, 10 dB Gain, PCS	900.00	
AP186013	NL	1710-1880	Panel, 60°, 13 dB Gain, PCS	1200.00	
AP186016	NL	1710-1880	Panel, 60°, 16 dB Gain, PCS	1500.00	
AP186017	NL	1710-1880	Panel, 60°, 17 dB Gain, PCS	1900.00	
AP186508-4	135-136	1710-1990	Panel, 65°, 8 dB, W/Fixed Mnt.	280.00	
AP186512-4	135-136	1710-1990	Panel, 65°, 12 dB, W/Fixed Mnt.	475.00	
AP186515-2	135-136	1710-1990	Panel, 65°, 15 dB, W/Tilt Mnt.	823.00	
AP186515-4	135-136	1710-1990	Panel, 65°, 15 dB, W/Fixed Mnt.	718.00	
AP186516-2	135-136	1710-1990	Panel, 65°, 16 dB, W/Tilt Mnt.	818.00	
AP186516-4	135-136	1710-1990	Panel, 65°, 16 dB, W/Fixed Mnt.	718.00	
AP189006-4	137-138	1710-1990	Panel, 90°, 6 dB, W/Fixed Mnt.	475.00	
AP189010-4	137-138	1710-1990	Panel, 90°, 10 dB, W/Fixed Mnt.	563.00	
AP189014-2	137-138	1710-1990	Panel, 90°, 14 dB, W/Tilt Mnt.	783.00	
AP189014-4	137-138	1710-1990	Panel, 90°, 14 dB, W/Fixed Mnt.	683.00	
AP189015-2	137-138	1710-1990	Panel, 90°, 15 dB, W/Tilt Mnt.	818.00	
AP189015-4	137-138	1710-1990	Panel, 90°, 15 dB, W/Fixed Mnt.	754.00	
AP861011	113-114	820-900	Panel, 100°, 11 dB Gain	700.00	Stocked
AP861014	115-116	824-894	Panel, 100°, 14 dB Gain	1486.00	
AP861214	NL	824-894	Panel, 120°, 14 dB Gain	1486.00	
AP863712	103-104	820-900	Panel, 37°, 12.2 dB Gain	1622.00	
AP863715	103-104	820-900	Panel, 37°, 15.2 dB Gain	2756.00	
AP866017	107-108	824-894	Panel, 60°, 17 dB Gain	3600.00	
AP881205	119-120	806-960	Panel, 120°, 4.5 dB Gain	500.00	
AP881208	119-120	806-960	Panel, 120°, 7.5 dB Gain	600.00	
AP886007	105-106	806-960	Panel, 60°, 7 dB Gain	525.00	Stocked
AP901008-2	117-118	824-960	Panel, 105°, 8 dB, W/Apm2-1	693.00	
AP901008-3	117-118	824-960	Panel, 105°, 8 dB, W/Apm3-1	600.00	
AP901008-4	117-118	824-960	Panel, 105°, 8 dB, W/Apm4-1	600.00	
AP901011-1	117-118	824-960	Panel, 105°, 11 dB, W/Apm1-1	1126.00	
AP901011-2	117-118	824-960	Panel, 105°, 11 dB, W/Apm2-1	1126.00	
AP901011-3	117-118	824-960	Panel, 105°, 11 dB, W/Apm3-1	1007.00	Stocked
AP901011-4	117-118	824-960	Panel, 105°, 11 dB, W/Apm4-1	1007.00	
AP901013-1	117-118	824-960	Panel, 105°, 13 dB, W/Apm1-1	2045.00	
AP901013-2	117-118	824-960	Panel, 105°, 13 dB, W/Apm2-1	2045.00	
AP901013-3	117-118	824-960	Panel, 105°, 13 dB, W/Apm3-1	1926.00	Stocked
AP901013-4	117-118	824-960	Panel, 105°, 13 dB, W/Apm4-1	1926.00	
AP901208-2	121-122	824-960	Panel, 120°, 7.5 dB W/Apm2-1	694.00	
AP901210-1	121-122	824-960	Panel, 120°, 10 dB W/Apm1-1	855.00	
AP901210-2	121-122	824-960	Panel, 120°, 10 dB W/Apm2-1	855.00	
AP901210-3	121-122	824-960	Panel, 120°, 10 dB W/Apm3-1	750.00	Stocked
AP901210-4	121-122	824-960	Panel, 120°, 10 dB W/Apm4-1	750.00	

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AP901213-1	121-122	824-960	Panel, 120°, 12.5 dB W/Apm1-1	1575.00	
AP901213-2	121-122	824-960	Panel, 120°, 12.5 dB W/Apm2-1	1575.00	
AP901213-3	121-122	824-960	Panel, 120°, 12.5 dB W/Apm3-1	1470.00	Stocked
AP901213-4	121-122	824-960	Panel, 120°, 12.5 dB W/Apm4-1	1470.00	
AP906510-1	109-110	824-960	Panel, 65°, 10 dB, W/Apm1-1	694.00	
AP906510-2	109-110	824-960	Panel, 65°, 10 dB, W/Apm2-1	694.00	
AP906510-3	109-110	824-960	Panel, 65°, 10 dB, W/Apm3-1	587.00	Stocked
AP906510-4	109-110	824-960	Panel, 65°, 10 dB, W/Apm4-1	587.00	
AP906513-1	109-110	824-960	Panel, 65°, 13 dB, W/Apm1-1	853.00	
AP906513-2	109-110	824-960	Panel, 65°, 13 dB, W/Apm2-1	853.00	
AP906513-3	109-110	824-960	Panel, 65°, 13 dB, W/Apm3-1	747.00	Stocked
AP906513-4	109-110	824-960	Panel, 65°, 13 dB, W/Apm4-1	747.00	
AP906516-1	109-110	824-960	Panel, 65°, 16 dB, W/Apm1-1	1547.00	
AP906516-2	109-110	824-960	Panel, 65°, 16 dB. W/Apm2-1	1547.00	
AP906516-3	109-110	824-960	Panel, 65°, 16 dB, W/Apm3-1	1440.00	Stocked
AP906516-4	109-110	824-960	Panel, 65°, 16 dB, W/Apm4-1	1440.00	
AP909009-2	111-112	824-960	Panel, 90°, 8.5 dB, W/Apm2-1	693.00	
AP909009-3	111-112	824-960	Panel, 90°, 8.5 dB, W/Apm3-1	482.00	
AP909009-4	111-112	824-960	Panel, 90°, 8.5 dB, W/Apm4-1	482.00	
AP909011-1	111-112	824-960	Panel, 90°, 11 dB, W/Apm1-1	1126.00	
AP909011-2	111-112	824-960	Panel, 90°, 11 dB, W/Apm2-1	1126.00	
AP909011-3	111-112	824-960	Panel, 90°, 11 dB, W/Apm3-1	1008.00	
AP909011-4	111-112	824-960	Panel, 90°, 11 dB, W/Apm4-1	1008.00	
AP909014-1	111-112	824-960	Panel, 90°, 13.5 dB, W/Apm1-1	2172.00	
AP909014-2	111-112	824-960	Panel, 90°, 13.5 dB, W/Apm2-1	2172.00	
AP909014-3	111-112	824-960	Panel, 90°, 13.5 dB, W/Apm3-1	1926.00	
AP909014-4	111-112	824-960	Panel, 90°, 13.5 dB, W/Apm4-1	1926.00	
AP916017	107-108	890-960	Panel, 60°, 17 dB Gain	3600.00	
AP926017	107-108	872-950	Panel, 60°, 17 dB Gain	3600.00	
APC867503	NL	824-894	Circularly Polarized, 75°, 3 dB	860.00	
APC867503-CM	NL	824-894	Circularly Polarized, 75°, 3 dB, Ceiling Mt.	616.00	
APM1-1	NL		Downtilt Mount, Fixed	180.00	
APM12-1	NL		Mechanical DT Mount, DCS Panel Ant	130.00	
APM14-1	NL		Fixed Mount, DCS Panel, Hose Clamp	35.00	
APM2-1	NL		Downtilt Mount, Slides On Mast	180.00	
APM3-1	NL		U-Clamp Mounting Kit	35.00	
APM4-1	NL		Clip Mounting Kit	35.00	
APP867007	NL	824-894	Panel Patch, 7 dB Gain, 70°	600.00	
APR859-30-16-4N	NL	824-894	Multibeam Antenna	4000.00	
APR1920-30-19-4N	NL	1850-1990	Multibeam Antenna	3700.00	
APR859-30-13-4N	NL	824-894	Multibeam Antenna	4000.00	
APR859-15-19-8N	NL	824-894	Multibeam Antenna	8000.00	
APV864612	123-124	824-894	Variable H Plane Panel Antenna	1300.00	
APV864615	123-124	824-894	Variable H Plane Panel Antenna	1980.00	Stocked

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APX859-30-16-8N	NL	824-894	Multibeam Antenna	5600.00	
AT882	NL		RF Attenuator	210.00	
AT883	NL		RF Attenuator	210.00	
BA1010-1	36-37	146-164	Fiberglass Omni Antenna	642.00	Stocked
BA1010-2	36-37	154-174	Fiberglass Omni Antenna	642.00	Stocked
BA1010-4	36-37	114-125	Fiberglass Omni Antenna	642.00	
BA1010-5	36-37	120-132	Fiberglass Omni Antenna	642.00	
BA1010-6	36-37	126-138	Fiberglass Omni Antenna	642.00	
BA1010-7	36-37	133-151	Fiberglass Omni Antenna	642.00	
BA1012	36-37	118-174*	Fiberglass Omni Antenna	251.00	Standard Freq. Stocked
BA1312	36-37	118-171*	3 dB Gain, Omni Fiberglass Antenna	360.00	Standard Freq. Stocked
BA3010	26-27	68-88*	Unity Gain, Fiberglass Antenna	758.00	
BA6012	56-58	406-512*	Unity Gain, Fiberglass Antenna	268.00	Standard Freq. Stocked
BA6110	56-58	406-512*	Unity Gain, Fiberglass Antenna	607.00	Standard Freq. Stocked
BA6312	56-58	406-503*	3 dB Gain, Omni Fiberglass Ant.	372.00	Standard Freq. Stocked
BCR10-A-B1 *P*	79-80	824-894	12.3 dB Gain, 220° Cardioid	3398.00	Standard Freq. Stocked
BCR10-B-B1 *P*	79-80	824-894	14 dB Gain, 140° Cardioid	3398.00	Standard Freq. Stocked
BCR10-D-B1 *P*	79-80	824-894	14.3 dB Gain, 120° Cardioid	3398.00	
BCR10-H-B1 *P*	79-80	824-894	13.4 dB Gain, Peanut	3398.00	Standard Freq. Stocked
BCR10-O-B1 *P*	79-80	824-894	10 dB Gain, Omni	3398.00	Standard Freq. Stocked
BCR10A/8A-B1*P*	85-86	824-894	Dual 12.3 + 10.3 dB, 220° Cardioid	6157.00	Standard Freq. Stocked
BCR10B/8B-B1*P*	85-86	824-894	Dual 14 + 12 dB Gain 140° Cardioid	6157.00	
BCR10H/8H-B1*P*	85-86	824-894	Dual 13.4 + 11.4 dB Gain, Peanut	6157.00	
BCR12-A-B1 *P*	79-80	824-894	14.3 dB Gain, 220° Cardioid	6157.00	Standard Freq. Stocked
BCR12-B-B1*P*	79-80	824-894	16 dB Gain, 140° Cardioid	6157.00	Standard Freq. Stocked
BCR12-D-B1 *P*	79-80	824-894	16.3 dB Gain, 120° Cardioid	6157.00	
BCR12-H-B1 *P*	79-80	824-894	15.4 dB Gain, Peanut	6157.00	Standard Freq. Stocked
BCR12-O-B1 *P*	79-80	824-894	12 dB Gain, Omni	6157.00	Standard Freq. Stocked
BCR6-A-B1 *P*	77-78	824-894	8.3 dB Gain, 220° Cardioid	2732.00	
BCR6-B-B1 *P*	77-78	824-894	10 dB Gain 140° Cardioid	2732.00	
BCR6-D-B1 *P*	77-78	824-894	10.3 dB Gain, 120° Cardioid	2732.00	
BCR6-H-B1 *P*	77-78	824-894	9.4 dB Gain, Peanut	2732.00	
BCR6-O-B1 *P*	77-78	824-894	6 dB Gain, Omni	2732.00	
BCR8-A-B1 *P*	77-78	824-894	10.3 dB Gain, 220° Cardioid	3398.00	
BCR8-B-B1*P*	77-78	824-894	12 dB Gain, 140° Cardioid	3398.00	
BCR8-H-B1 *P*	77-78	824-894	11.4 dB Gain, Peanut	3398.00	
BCR8-O-B1 *P*	77-78	824-894	8 dB Gain, Omni	3398.00	
BCR8O/6O-B1 *P*	83-84	824-894	Dual 8 + 6 dB Gain, Omni	4042.00	
BGHR6-O	NL	1850-1990	Omnidirectional, 7.3 dB Gain, PCS	2732.00	
BL060D	NL	25-1000	Load Termination, 60 Watt, N-Male	106.00	
BL060DF	NL	25-1000	Load Termination, 60 Watt N-Female	106.00	
BL060DS	NL	25-1000	Load Term, 60 Watt, N-Male, Sensed	133.00	
BL060E	NL	25-1000	Load Termination, 60 Watt	106.00	
BL060G	NL	25-1000	Load Term., 60W (TJ/TL Combiner)	106.00	

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BL060H	NL	25-1000	Load Term., 60W (SJ Combiners)	106.00	
BMR10-A-B1 *P*	79-80	806-869	12.3 dB Gain, 220° Cardioid	3398.00	Standard Freq. Stocked
BMR10-B-B1 *P*	79-80	806-869	14 dB Gain, 140° Cardioid	3398.00	
BMR10-D-B1 *P*	79-80	806-869	14.3 dB Gain, 120° Cardioid	3398.00	
BMR10-H-B1 *P*	79-80	806-869	13.4 dB Gain, Peanut	3398.00	
BMR10-O-B1 *P*	79-80	806-869	10 dB Gain, Omni	3398.00	Standard Freq. Stocked
BMR10A/8A-B1*P*	85-86	806-869	Dual 12.3 + 10.3 dB, 220° Cardioid	6157.00	
BMR10B/8B-B1*P*	85-86	806-869	Dual 14 + 12 dB, 140° Cardioid	6157.00	
BMR10H/8H-B1*P*	85-86	806-869	Dual 13.4 + 11.4 dB Gain, Peanut	6157.00	
BMR12-A-B1*P*	79-80	806-869	14.3 dB Gain, 220° Cardioid	6157.00	Standard Freq. Stocked
BMR12-B-B1*P*	79-80	806-869	16 dB Gain, 140° Cardioid	6157.00	
BMR12-D-B1*P*	79-80	806-869	16.3 dB Gain, 120° Cardioid	6157.00	
BMR12-H-B1*P*	79-80	806-869	15.4 dB Gain, Peanut	6157.00	
BMR12-O-B1*P*	79-80	806-869	12 dB Gain, Omni	6157.00	Standard Freq. Stocked
BMR6-A-B1*P*	77-78	806-869	8.3 dB Gain, 220° Cardioid	2732.00	
BMR6-B-B1*P*	77-78	806-869	10 dB Gain, 140° Cardioid	2732.00	
BMR6-D-B1*P*	77-78	806-869	10.3 dB Gain, 120° Cardioid	2732.00	
BMR6-H-B1*P*	77-78	806-869	9.4 dB Gain, Peanut	2732.00	
BMR6-O-B1*P*	77-78	806-869	6 dB Gain, Omni	2732.00	
BMR8-A-B1*P*	77-78	806-869	10.3 dB Gain, 220° Cardioid	3398.00	
BMR8-B-B1*P*	77-78	806-869	12 dB Gain, 140° Cardioid	3398.00	
BMR8-H-B1*P*	77-78	806-869	11.4 dB Gain, Peanut	3398.00	
BMR8-O-B1*P*	77-78	806-869	8 dB Gain, Omni	3398.00	
BMR8A/6A-B1*P*	83-84	806-869	Dual 10.3 + 8.3 dB, 220° Cardioid	4042.00	
BMR8B/6B-B1*P*	83-84	806-869	Dual 12 + 10 dB, 140° Cardioid	4042.00	
BMR8H/6H-B1*P*	83-84	806-869	Dual 11.4 + 9.4 dB Gain, Peanut	4042.00	
BMR8O/6O-B1*P*	83-84	806-869	Dual 8 + 6 dB Gain, Omni	4042.00	
BMSL10-O-B1*P*	81-82	806-906	10 dB Gain, Omni	3398.00	
BMSL12-A-B1*P*	81-82	806-906	14.3 dB Gain, 220° Cardioid	6157.00	
BMSL12-B-B1*P*	81-82	806-906	16 dB Gain, 140° Cardioid	6157.00	
BMSL12-D-B1*P*	81-82	806-906	16.3 dB Gain, 120° Cardioid	6157.00	
BMSL12-H-B1*P*	81-82	806-906	15.4 dB Gain, Peanut	6157.00	
BMSL12-O-B1*P*	81-82	806-906	12 dB Gain, Omni	6157.00	
BMSU10-A-B1*P*	81-82	850-960	12.3 dB Gain, 220° Cardioid	3398.00	
BMSU10-O-B1*P*	81-82	850-960	10 dB Gain, Omni	3398.00	
BMSU12-A-B1*P*	81-82	850-960	14.3 dB Gain, 220° Cardioid	6157.00	
BMSU12-B-B1*P*	81-82	850-960	16 dB Gain, 140° Cardioid	6157.00	
BMSU12-D-B1*P*	81-82	850-960	16.3 dB Gain, 120° Cardioid	6157.00	
BMSU12-H-B1*P*	81-82	850-960	15.4 dB Gain, Peanut	6157.00	
BMSU12-O-B1*P*	81-82	850-960	12 dB Gain, Omni	6157.00	
BPR10-A-B1*P*	79-80	928-960	12.3 dB Gain, 220° Cardioid	3398.00	
BPR10-B-B1*P*	79-80	928-960	14 dB Gain, 140° Cardioid	3398.00	
BPR10-H-B1*P*	79-80	928-960	13.4 dB Gain, Peanut	3398.00	
BPR10-O-B1*P*	79-80	928-960	10 dB Gain, Omni	3398.00	

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
BPR10A/8A-B1*P*	85-86	928-960	Dual 12.3 + 10.3 dB, 220° Cardioid	6157.00	
BPR10B/8B-B1*P*	85-86	928-960	Dual 14 + 12 dB, 140° Cardioid	6157.00	
BPR10H/8H-B1*P*	85-86	928-960	Dual 13.4 + 11.4 dB Gain, Peanut	6157.00	
BPR10O/8O-B1*P*	85-86	928-960	Dual 10 + 8 dB Gain, Omni	6157.00	
BPR12-A-B1*P*	79-80	928-960	14.3 dB Gain, 220° Cardioid	6157.00	
BPR12-H-B1*P*	79-80	928-960	15.4 dB Gain, Peanut	6157.00	
BPR12-O-B1*P*	79-80	928-960	12 dB Gain, Omni	6157.00	
BPR6-A-B1*P*	77-78	928-960	8.3 dB Gain, 220° Cardioid	2732.00	
BPR6-H-B1*P*	77-78	928-960	9.4 dB Gain, Peanut	2732.00	
BPR6-O-B1*P*	77-78	928-960	6 dB Gain, Omni	2732.00	
BPR8-A-B1*P*	77-78	928-960	10.3 dB Gain, 220° Cardioid	3398.00	
BPR8-H-B1*P*	77-78	928-960	11.4 dB Gain, Peanut	3398.00	
BPR8-O-B1*P*	77-78	928-960	8 dB Gain, Omni	3398.00	
BPR8A/6A-B1*P*	83-84	928-960	Dual 10.3 + 8.3 dB, 220° Cardioid	4042.00	
BPR8B/6B-B1*P*	83-84	928-960	Dual 12 + 10 dB, 140° Cardioid	4042.00	
BPR8O/6O-B1*P*	83-84	928-960	Dual 8 + 6 dB Gain, Omni	4042.00	
CAB-1	NL		Cable Set	95.00	
CC078-0	NL	66-88	Circulator, Only	347.00	
CC078-A	NL	66-88	Isolator, 15 Watt Load	389.00	
CC078-AA	NL	66-88	Isolator, 30 Watt Load	427.00	
CC078-B	NL	66-88	Isolator, 60 Watt Load	455.00	
CC078-C	NL	66-88	Isolator, 150 Watt Load	590.00	
CC078-S	NL	66-88	Isolator, 60 Watt Load Sensed	481.00	
CC150-0	NL	136-174	Circulator, Only	347.00	
CC150-A	NL	136-174	Isolator, 15 Watt Load	389.00	
CC150-AA	NL	136-174	Isolator, 30 Watt Load	427.00	
CC150-B	NL	136-174	Isolator, 60 Watt Load	455.00	
CC150-C	NL	136-174	Isolator, 150 Watt Load	590.00	
CC150-S	NL	136-174	Isolator, 60 Watt Load Sensed	481.00	
CC280-0	NL	250-285	Circulator, Only	347.00	
CC280-A	NL	250-285	Isolator, 15 Watt Load	389.00	
CC280-AA	NL	250-285	Isolator, 30 Watt Load	427.00	
CC280-B	NL	250-285	Isolator, 60 Watt Load	455.00	
CC280-C	NL	250-285	Isolator, 150 Watt Load	590.00	
CC280-H	NL	250-285	Isolator, 300 Watt Load	791.00	
CC280-S	NL	250-285	Isolator, 60 Watt Load Sensed	481.00	
CC460-0	NL	406-512	Circulator, Only	347.00	
CC460-A	NL	406-512	Isolator, 15 Watt Load	389.00	
CC460-AA	NL	406-512	Isolator, 30 Watt Load	427.00	
CC460-B	NL	406-512	Isolator, 60 Watt Load	455.00	
CC460-C	NL	406-512	Isolator, 150 Watt Load	590.00	
CC460-S	NL	406-512	Isolator, 60 Watt Load Sensed	481.00	
CC870-0	NL	806-1000	Circulator, Only	255.00	
CC870-A	NL	806-1000	Isolator, 15 Watt Load	297.00	

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CC870-AA	NL	806-1000	Isolator, 30 Watt Load	335.00	
CC870-B	NL	806-1000	Isolator, 60 Watt Load	361.00	
CC870-C	NL	806-1000	Isolator, 150 Watt Load	494.00	
CC870-S	NL	806-1000	Isolator, 60 Watt Load Sensed	388.00	
CD078-0	NL	66-88	Circulator, Only	671.00	
CD078-A	NL	66-88	Isolator, 15 & 15 Watt Load	714.00	
CD078-AA	NL	66-88	Isolaotor, 15 & 30 Watt Load	752.00	
CD078-B	NL	66-88	Isolator, 15 & 60 Watt Load	779.00	
CD078-C	NL	66-88	Isolator, 15 & 150 Watt Load	915.00	
CD078-S	NL	66-88	Isolator, 15 & 60 Watt Load Sensed	807.00	
CD150-0	NL	136-174	Circulator, Only	671.00	
CD150-A	NL	136-174	Isolator, 15 & 15 Watt Load	714.00	
CD150-AA	NL	136-174	Isolator, 15 & 30 Watt Load	752.00	
CD150-B	NL	136-174	Isolator, 15 & 60 Watt Load	779.00	
CD150-C	NL	136-174	Isolator, 15 & 150 Watt Load	915.00	
CD150-S	NL	136-174	Isolator, 15 & 60 Watt Load Sensed	807.00	
CD280-0	NL	250-285	Circulator, Only	671.00	
CD280-A	NL	250-285	Isolaotor 15 & 15 Watt Load	714.00	
CD280-B	NL	250-285	Isolator, 15 & 60 Watt Load	779.00	
CD280-C	NL	250-285	Isolator, 15 & 150 Watt Load	915.00	
CD460-0	NL	406-512	Circulator, Only	671.00	
CD460-A	NL	406-512	Isolator, 15 & 15 Watt Load	714.00	
CD460-AA	NL	406-512	Isolator, 15 & 30 Watt Load	752.00	
CD460-B	NL	406-512	Isolator, 15 & 60 Watt Load	779.00	
CD460-C	NL	406-512	Isolator, 15 & 150 Watt Load	915.00	
CD460-S	NL	406-512	Isolator, 15 & 60 Watt Load Sensed	807.00	
CD870-0	NL	806-1000	Circulator, Only	494.00	
CD870-A	NL	806-1000	Isolator, 15 & 15 Watt Load	536.00	
CD870-AA	NL	806-1000	Isolator, 15 & 30 Watt Load	573.00	
CD870-B	NL	806-1000	Isolator, 15 & 60 Watt Load	600.00	
CD870-C	NL	806-1000	Isolator, 15 & 150 Watt Load	732.00	
CD870-H	NL	806-1000	Isolator, 15 & 300 Watt Load	908.00	
CD870-S	NL	806-1000	Isolator, 15 & 60 Watt Load Sensed	626.00	
CEL-1	87	825-890	Unity Gain Cell. Ant. W/10290 Mnt.	219.00	Stocked
CEL-1A	87	806-866	Unity Gain Cell. Ant. W/10290 Mnt.	219.00	Stocked
CEL-3	87	824-894	3dB Gain, Cell. Contl St. W/10290 Mnt.	324.00	
CEL-3S	87	806-866	3dB Gain, Cell. Contl St. W/10290 Mnt.	324.00	Stocked
CFX836-6N	189-190	824-846.5	Cellular Preselector	256.00	
CFX836-6W	189-190	824-849	Cellular Preselector	256.00	
CFX836-8N	189-190	824-846.5	Cellular Preselector	284.00	
CFX836-8W	189-190	824-849	Cellular Preselector	284.00	
CFX842-6	189-190	835-849	Cellular Preselector	256.00	
CFX842-8	189-190	835-849	Cellular Preselector	336.00	
CL150-D	NL	25-1000	Load Termination, 150 Watt	239.00	

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CL150-P	NL	25-1000	Load Termination, 150 Watt, Sensed	239.00	
CS-1	156		Great Seal Cold Shrink 1/2" - 7/8"	35.00	Stocked
CS-2	156		Great Seal Cold Shrink 1/2"-1-5/8"	38.00	Stocked
CS-5	156		Great Seal Cold Shrink 1/2" - 1/2"	21.00	
CS-6	156		Great Seal Cold Shrink 7/8" - 7/8"	32.00	
CS-7	156		Great Seal, CS 1-1/4" - 1-5/8"	32.00	
CT078-0	NL	66-88	Circulator, Only	996.00	
CT078-A	NL	66-88	Isolator, 15 & 15 & 15 Watt Load	1038.00	
CT078-AA	NL	66-88	Isolator, 15 & 15 & 30 Watt Load	1077.00	
CT078-B	NL	66-88	Isolator, 15 & 15 & 60 Watt Load	1104.00	
CT078-C	NL	66-88	Isolator, 15 & 15 & 150 Watt Load	1239.00	
CT078-S	NL	66-88	Isolator, 15 & 15 & 60 W Load Sens	1131.00	
CT150-0	NL	136-174	Circulator, Only	996.00	
CT150-A	NL	136-174	Isolator, 15 & 15 & 15 Watt Load	1038.00	
CT150-AA	NL	136-174	Isoaltor, 15 & 15 & 30 Watt Load	1077.00	
CT150-B	NL	136-174	Isolator, 15 & 15 & 60 Watt Load	1104.00	
CT150-C	NL	136-174	Isolator, 15 & 15 & 150 Watt Load	1239.00	
CT150-S	NL	136-174	Isolator, 15 & 15 & 60 W Load Sens	1131.00	
CT460-0	NL	406-512	Circulator, Only	996.00	
CT460-A	NL	406-512	Isolator, 15 & 15 & 15 Watt Load	1038.00	
CT460-AA	NL	406-512	Isolator, 15 & 15 & 30 Watt Load	1077.00	
CT460-B	NL	406-512	Isolator, 15 & 15 & 60 Watt Load	1104.00	
CT460-C	NL	406-512	Isolator, 15 & 15 & 150 Watt Load	1239.00	
CT460-S	NL	406-512	Isolator, 15 & 15 & 60 W Load Sens	1131.00	
CT870-0	NL	806-1000	Circulator, Only	732.00	
CT870-A	NL	806-1000	Isolator, 15 & 15 & 15 Watt Load	774.00	
CT870-AA	NL	806-1000	Isolator, 15 & 15 & 30 Watt Load	812.00	
CT870-B	NL	806-1000	Isolator, 15 & 15 & 60 Watt Load	838.00	
CT870-C	NL	806-1000	Isolator, 15 & 15 & 150 Watt Load	971.00	
DC-2	NL		DC Block	155.00	
DCG1-070	285-286	66-88	Guardian Single Direc. Coupler	148.00	
DCG1-150	285-286	132-174	Guardian Single Direc. Coupler	148.00	
DCG1-460	285-286	406-512	Guardian Single Direc. Coupler	148.00	
DCG1-800	285-286	800-1000	Guardian Single Direc. Coupler	145.00	
DCG2-070	285-286	66-88	Guardian Dual Direc. Coupler	175.00	
DCG2-150	285-286	132-174	Guardian Dual Direc. Coupler	175.00	
DCG2-460	285-286	406-512	Guardian Dual Direc. Coupler	175.00	
DCG2-800	285-286	800-1000	Guardian Dual Direc. Coupler	175.00	
FB18102-1	196	1805-1880	Bandpass Filter	1493.00	
FB18102-2	195	1710-1785	Bandpass Filter	1493.00	
FB19102-1	196	1930-1990	Bandpass Filter	1493.00	
FB19102-2	195	1850-1910	Bandpass Filter	1493.00	
FD1842-1	193-194	1710-1880	Bandpass Filter	1495.00	
FD1842-2	193-194	1850-1990	Bandpass Filter	1495.00	

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
FD9042-1	191-192	890-960	Duplex Filter	1495.00	
FD9042-2	191-192	880-960	Duplex Filter	1495.00	
HC078-B	NL	66-88	Isolator, 60 Watt Load H/P	1434.00	
HC078-C	NL	66-88	Isolator, 150 Watt Load H/P	1542.00	
HC078-H	NL	66-88	Isolator, 300 Watt Load H/P	1758.00	
HC150-0	NL	136-174	Circulator, Only High Power	1325.00	
HC150-AA	NL	136-174	Isolator, High Power, 30 Watt	1407.00	
HC150-B	NL	136-174	Isolator, High Power, 60 Watt	1434.00	
HC150-C	NL	136-174	Isolator, High Power, 150 Watt	1569.00	
HC150-H	NL	136-174	Isolator, High Power, 300 Watt	1785.00	
HC150-S	NL	136-174	Isolator, High Power, 60W Sensed	1461.00	
HC460-0	NL	406-512	Circulator, Only High Power	704.00	
HC460-AA	NL	406-512	Isolator, High Power, 30W Load	784.00	
HC460-B	NL	406-512	Isolator, High Power, 60W Load	812.00	
HC460-C	NL	406-512	Isolator, High Power, 150W Load	947.00	
HC460-H	NL	406-512	Isolator, High Power, 300W Load	1163.00	
HC460-S	NL	406-512	Isolator, H/P, 60W Load Sensed	838.00	
HC800-0	NL	806-1000	Circulator, Only High Power	514.00	
HC800-AA	NL	806-1000	Isolator, High Power, 30W Load	594.00	
HC800-B	NL	806-1000	Isolator, High Power, 60W Load	620.00	
HC800-C	NL	806-1000	Isolator, High Power, 150W Load	753.00	
HC800-H	NL	806-1000	Isolator, High Power, 300W Load	965.00	
HD150-0	NL	136-174	Circulator, Only High Power	2651.00	
HD150-AA	NL	136-174	Isolator, H/P, 30 & 30 Watt	2733.00	
HD150-B	NL	136-174	Isolator, H/P, 30 & 60 Watt	2759.00	
HD150-C	NL	136-174	Isolator, H/P, 30 & 150 Watt	2895.00	
HD150-H	NL	136-174	Isolator, H/P, 30 & 300 Watt	3111.00	
HD150-S	NL	136-174	Isolator, H/P, 30 & 60 Watt Sensed	2787.00	
HD460-0	NL	406-512	Circulator, Only High Power	1407.00	
HD460-AA	NL	406-512	Isoolator H/P, 30 & 30 Watt Load	1488.00	
HD460-B	NL	406-512	Isolator, H/P, 30 & 60 Watt Load	1515.00	
HD460-C	NL	406-512	Isolator, H/P, 30 & 150 Watt Load	1650.00	
HD460-H	NL	406-512	Isolator, H/P, 30 & 300 Watt Load	1867.00	
HD460-S	NL	406-512	Isolator, H/P, 30 & 60 Watt Sensed	1542.00	
HD800-0	NL	806-1000	Circulator, Only High Power	1029.00	
HD800-AA	NL	806-1000	Isolator, H/P, 30 & 30 Watt Load	1109.00	
HD800-B	NL	806-1000	Isolator, H/P, 30 & 60 Watt Load	1135.00	
HD800-C	NL	806-1000	Isolator, H/P, 30 & 150 Watt Load	1268.00	
HD800-H	NL	806-1000	Isolator, H/P, 30 & 300 Watt Load	1480.00	
HD800-S	NL	806-1000	Isolator, H/P, 30&60 W Load Sensed	1162.00	
HH070-U	NL	66-88	Hybrid, Universal Mtg. Style	443.00	
HH150-U	NL	136-174	Hybrid, Universal Mtg. Style	443.00	
HH460-U	NL	406-512	Hybrid, Universal Mtg. Style	443.00	
HH800-U	NL	806-1000	Hybrid, Universal Mtg. Style	290.00	

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HL300D	NL	25-1000	Load Termination (Dry) 300 Watt	451.00	
IT600	289		Sampler	55.00	
MB150	NL	150-174	Matching Network	110.00	
MB460	NL	406-512	Matching Network	110.00	
MB900	NL	806-1000	Matching Network	72.00	
N240F	141		Thread Mount for E179F	21.00	
N295F	87		Rail Mount	70.00	
PA901	273-274	800-960*	High Power Amplifier	801.00	
PA9142	273-274	800-960*	High Power Amplifier	1600.00	
PA9144	273-274	800-960*	High Power Amplifier	4254.00	
PA9148	273-274	800-960*	High Power Amplifier	2478.00	
PA9340A	273-274	800-960*	High Power Amplifier	1510.00	
PBH070	NL	66-88	2 Channel Coupler 60 Watt	758.00	
PBH150	NL	136-174	2 Channel Coupler 60 Watt	758.00	
PBH460	NL	406-512	2 Channel Coupler 60 Watt	758.00	
PBH800	NL	806-1000	2 Channel Coupler 60 Watt	506.00	
PCC078-AA	NL	66-88	Isolation Panel, 30 Watt	644.00	
PCC078-B	NL	66-88	Isolation Panel, 60 Watt	671.00	
PCC078-C	NL	66-88	Isolation Panel, 150 Watt	807.00	
PCC078-S	NL	66-88	Isolation Panel, 60 Watt Sensed	698.00	
PCC150-AA	NL	136-174	Isolation Panel, 30 Watt	644.00	
PCC150-B	NL	136-174	Isolation Panel, 60 Watt	671.00	
PCC150-C	NL	136-174	Isolation Panel, 150 Watt	807.00	
PCC150-S	NL	136-174	Isolation Panel, 60 Watt Sensed	698.00	
PCC460-AA	NL	406-512	Isolation Panel, 30 Watt	606.00	
PCC460-B	NL	406-512	Isolation Panel, 60 Watt	632.00	
PCC460-C	NL	406-512	Isoaltion Panel, 150 Watt	768.00	
PCC460-S	NL	406-512	Isolation Panel, 60 Watt Sensed	660.00	
PCC800-AA	NL	806-1000	Isolation Panel, 30 Watt	547.00	
PCC800-B	NL	806-1000	Isolation Panel, 60 Watt	573.00	
PCC800-C	NL	806-1000	Isolation Panel, 150 Watt	706.00	
PCC800-S	NL	806-1000	Isolation Panel, 60 Wall Sensed	600.00	
PCD078-AA	NL	66-88	Isolation Panel, 15 & 30 Watt	969.00	
PCD078-B	NL	66-88	Isolation Panel, 15 & 60 Watt	996.00	
PCD078-C	NL	66-88	Isolation Panel, 15 & 150 Watt	1131.00	
PCD078-S	NL	66-88	Isoaltion Panel, 15 & 60 W Sensed	1023.00	
PCD150-AA	NL	136-174	Isolation Panel, 15 & 30 Watt	969.00	
PCD150-B	NL	136-174	Isolation Panel, 15 & 60 Watt	996.00	
PCD150-C	NL	136-174	Isolation Panel, 15 & 150 Watt	1131.00	
PCD150-S	NL	136-174	Isolation Panel, 15 & 60 W Sensed	1023.00	
PCD460-AA	NL	406-512	Isolation Panel, 15 & 30 Watt	930.00	
PCD460-B	NL	406-512	Isolation Panel, 15 & 60 Watt	957.00	
PCD460-C	NL	406-512	Isolation Panel, 15 & 150 Watt	1092.00	
PCD460-S	NL	406-512	Isolation Panel, 15 & 60 W Sensed	984.00	

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PCD800-AA	NL	806-1000	Isolation Panel, 15 & 30 Watt	785.00	
PCD800-B	NL	806-1000	Isolation Panel, 15 & 60 Watt	812.00	
PCD800-C	NL	806-1000	Isolation Panel, 15 & 150 Watt	945.00	
PCD800-S	NL	806-1000	Isolation Panel, 15 & 60 W Sensed	838.00	
PCH070	NL	66-88	2 Channel Coupler, 150 Watt	833.00	
PCH150	NL	136-174	2 Channel Coupler, 150 Watt	833.00	
PCH460	NL	406-512	2 Channel Coupler, 150 Watt	833.00	
PCH800	NL	806-1000	2 Channel Coupler, 150 Watt	557.00	
PCN6-1	97-98	901-902	6 dB Gain, Fiberglass Antenna	900.00	
PCN6-2	97-98	928-941	6 dB Gain, Fiberglass Antenna	900.00	Stocked
PCN9-1	97-98	901-902	9 dB Gain, Fiberglass Antenna	1176.00	
PCN9-2	97-98	928-941	9 dB Gain, Fiberglass Antenna	1176.00	Stocked
PCT078-AA	NL	66-88	Isolation Panel, 15 & 15 & 30 Watt	1293.00	
PCT078-B	NL	66-88	Isolation Panel, 15 & 15 & 60 Watt	1320.00	
PCT078-C	NL	66-88	Isolation Panel 15 & 15 & 150 Watt	1456.00	
PCT078-S	NL	66-88	Isolation Panel, 15&15&60 W Sensed	1347.00	
PCT150-AA	NL	136-174	Isolation Panel, 15 & 15 & 30 Watt	1293.00	
PCT150-B	NL	136-174	Isolation Panel, 15 & 15 & 60 Watt	1320.00	
PCT150-C	NL	136-174	Isolation Panel, 15 & 15 & 150 W	1456.00	
PCT150-S	NL	136-174	Isolation Panel, 15&15&60 W Sensed	1347.00	
PCT460-AA	NL	406-512	Isolation Panel, 15 & 15 & 30 Watt	1255.00	
PCT460-B	NL	406-512	Isolation Panel, 15 & 15 & 60 Watt	1282.00	
PCT460-C	NL	406-512	Isolation Panel, 15 & 15 & 150 W	1417.00	
PCT460-S	NL	406-512	Isolation Panel, 15&15&60 W Sensed	1309.00	
PCT800-B	NL	806-1000	Isolation Panel, 15 & 15 & 60 Watt	1130.00	
PCT800-S	NL	806-1000	Isolation Panel 15&15&60 W Sensed	1157.00	
PD10000	44, 67		Reflector Assy for PD458 Antenna	143.00	
PD10002	143		Side Mounting (Short)	217.00	Stocked
PD1001	44, 67		Reflector Assy for PD200	225.00	
PD10017	88-90	800-960*	10 dB, Omni Collinear Cellular	1556.00	Standard Freq. Stocked
PD10017HW	88-90	806-960*	10 dB, Omni Collinear Hi/Wind	1838.00	
PD10022	95	806-960*	Unity Gain Fiberglass Antenna	381.00	Standard Freq. Stocked
PD10024	145		Side Mounting Assembly (Short)	433.00	Stocked
PD10028	145		Side Mounting Assembly (Long)	498.00	Stocked
PD10041	88-90	806-960*	7.5 dB Gain, Base Station Omni	1421.00	Standard Freq. Stocked
PD10041E	88-90	824-894	7.5 dB Gain Collinear Full Band HD	1421.00	
PD10049	44, 67		Reflector Assy for PD755	242.00	
PD10054	70-71	400-512*	7.3 dB Gain, Panel	635.00	Standard Freq. Stocked
PD10055	70-71	400-512*	10 dB Gain, Panel	1100.00	Standard Freq. Stocked
PD10057	156		Nylon Cable Ties (Pkg.50)	60.00	Stocked
PD10064	141		Adjustable Wall Mtg. Hardware	170.00	
PD1007	44, 67		Reflector Assy For PD1151	225.00	
PD10071	148	806-1000	Power Divider Harness, 2-Way W/Cab	208.00	Standard Freq. Stocked
PD10072	148	800-960	Power Divider Harness, 2-Way	130.00	Standard Freq. Stocked

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
PD10075	148	406-512	Power Divider Harness, 3-Way	355.00	
PD10076	148	800-960	Power Divider Harness, 3-Way	355.00	Standard Freq. Stocked
PD10077	148	406-512	Power Divider Harness, 4-Way	355.00	
PD10078	148	800-960	Power Divider Harness, 4-Way	355.00	
PD10079	148	406-512	Power Divider Harness, 2-Way	209.00	
PD10085L	NL	824-894	8 dB 60° Panel W/25°DT "Localizer"	775.00	
PD10085R	NL	806-960	10 dB Gain, 60° Sector	674.00	Standard Freq. Stocked
PD10087	142		Universal Crossover Clamp Assy	204.00	Stocked
PD10088-18	NL		RG214/U W/N(M) to N(M) 18"	44.00	
PD10088-36	NL		RG214/U W/N(M) to N(M) 36"	58.00	
PD10088-72	NL		RG214/U W/N(M) to N(M) 72"	84.00	
PD10088-96	NL		RG214/U W/N(M) to N(M) 96"	103.00	
PD10089-18	NL		RG214/U W/UHF(M) to N(M) 18"	44.00	
PD10089-36	NL		RG214/U W/UHF(M) to N(M) 36"	58.00	
PD10089-72	NL		RG214/U W/UHF(M) to N(M) 72"	84.00	
PD10089-96	NL		RG214/U W/UHF(M) to N(M) 96"	103.00	
PD1009	44, 67		Reflector Assy for PD1150	225.00	
PD10090-18	NL		RG214/U W/UHF(M) to UHF(F) 18"	44.00	
PD10090-36	NL		RG214/U W/UHF(M) to UHF(F) 36"	58.00	
PD10090-72	NL		RG214/U W/UHF(M) to UHF(F) 72"	84.00	
PD10090-96	NL		RG214/U W/UHF(M) to UHF(F) 96"	103.00	
PD10091-36	NL		LLFLEX 12 N(M) to N(M) 36"	137.00	Stocked
PD10091-72	NL		LLFLEX 12 N(M) to N(M) 72"	148.00	Stocked
PD10091-96	NL		LLFLEX 12 N(M) to N(M) 96"	156.00	
PD10099	NL	806-960	13 dB Gain, 60° Sector	1461.00	Standard Freq. Stocked
PD10108	127-128	806-960*	10 dB Gain, Single Yagi	252.00	Standard Freq. Stocked
PD10108D	127-128	806-960*	13 dB Gain, Dual Yagi	599.00	
PD10116	146-147		Side Mtg. Assy./PD200 (3"-4")	792.00	
PD10118	146-147		Side Mtg. Assy./PD200 (3"-4")	685.00	
PD10120	146-147		Side Mtg. Assy./PD220,455 (3"-4")	685.00	
PD10121	146-147		Side Mtg. Assy./PD220,455 (3"-4")	792.00	
PD10122	146-147		Side Mtg. Assy./PD220,455 (4"-6")	570.00	
PD10123	146-147		Side Mtg. Assy./PD220,455 (4"-6")	928.00	
PD10124	146-147		Side Mtg. Assy./PD620,755 (3"-4")	792.00	
PD10125	146-147		Side Mtg. Assy./PD620,755 (4"-6")	928.00	
PD10128	146-147		Side Mtg. Assy./PD201,399 (3"-4")	792.00	
PD10136	146-147		Side Mtg. Assy./PD458,Cell.(3"-4")	512.00	
PD10137	146-147		Side Mtg. Assy./PD458,Cell.(4"-6")	588.00	
PD10138	146-147		Side Mtg. Assy./PD458,Cell.(3"-4")	856.00	
PD10139	146-147		Side Mtg. Assy./PD458,Cell.(4"-6")	986.00	
PD10140	146-147		Side Mtg. Assy./PD79,83 (4"-6")	580.00	
PD10141	146-147		Side Mtg. Assy./PD79,83 (4"-6")	568.00	
PD10142	146-147		Side Mtg. Assy./PD79,83 (3"-4")	792.00	
PD10145	146-147		Side Mt. Assy./PD400,10037,(4"-6")	570.00	

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PD10150	146-147		Side Mtg. Assy./PD1150 (3"-4")	792.00	
PD10153	146-147		Side Mtg. Assy./PD1151 (4"-6")	570.00	
PD10162	99	824-894*	1/4Wave Single Reflect./ PD1110	1970.00	
PD10163	99	824-894*	1/2Wave Single Reflect./ PD1110	1970.00	
PD10164	99	824-894*	1/4Wave Sing. Reflect./ PD10017	2135.00	Stocked
PD10165	99	824-894*	1/2Wave Single Reflect./ PD10017	2135.00	
PD10166	99	824-894*	1/4Wave Single Reflect./ PD1109	1806.00	
PD10168	99	824-894*	1/4Wave Dual Reflector/ PD1110	2042.00	
PD10170	99	824-894*	1/4Wave Dual Reflector/ PD10017	2205.00	
PD10172	99	824-894*	1/4Wave Dual Reflector/ PD1109E	1878.00	
PD10175	NL	806-960	16 dB Gain, 60° Panel, AMPS & TACS	3596.00	
PD10175H	NL	806-960	16 dB 60° Panel AMPS & TACS W/Pipe	3652.00	
PD10176-3	NL	800-900	9 dB 105° Panel, AMPS W/O Hardware	964.00	
PD10176-4	NL	800-900	9 dB, 105° Panel, AMPS W/Hardware	1013.00	
PD10177	NL	824-894	16 dB Gain, 60° Panel, AMPS	1900.00	
PD10177H	NL	824-894	16 dB Gain, 60° Panel, AMPS W/Pipe	1950.00	
PD10178	NL	890-960	16 dB Gain, 60° Panel, TACS	1900.00	
PD10178H	NL	890-960	16 dB Gain, 60° Panel, TACS W/Pipe	1950.00	
PD10180	145		Tilt Mount Kit	798.00	Stocked
PD10183	91-92	806-960*	10 dB Gain, Broadband, Omni	1920.00	
PD10186	105-106	806-960	7 dB Gain, 60° Sector	525.00	
PD10188	NL	820-960	10.5 dB Gain, 120° Panel	800.00	Standard Freq. Stocked
PD10189	NL	820-960	13.5 dB Gain, 120° Panel	1484.00	Standard Freq. Stocked
PD10191	54-55	279-281	Unity Gain, Fiberglass Collinear	468.00	
PD10197	NL	824-894	11.5 dB Gain, Wideband 90° Sector	980.00	Standard Freq. Stocked
PD10200RS	NL	824-894	14.5 dB Gain, Wideband 90° Sector	1484.00	
PD10201	NL	800-900	12 dB Gain, 105° AMPS Antenna	2528.00	Standard Freq. Stocked
PD10204R	54-55	279-281	3 dB Gain, Omni Collinear Antenna	537.00	Standard Freq. Stocked
PD10206	145		Adapter Plate Kit For PD10180	435.00	
PD10212-1	125-126	806-896	5.5 dB Gain, Yagi	174.00	
PD10212-2	125-126	900-960	5.5 dB Gain, Yagi	174.00	
PD10213	NL	824-894	6 dB Gain, 80° Sector	560.00	
PD10214	NL	824-894	9 dB Gain, 80° Sector	680.00	
PD10215	NL	824-894	12 dB Gain, 80° Sector	1360.00	
PD10216	119-120	806-960	4.5 dB Gain, 120° Sector	500.00	
PD10217	119-120	806-960	7.5 dB Gain, 120° Sector	600.00	
PD10219	107-108	890-960	17 dB, 62° Wideband Sector	3600.00	
PD10225	NL	820-900	8.5 dB Gain, 90° Sector	710.00	
PD10226	NL	820-900	5.5 dB Gain, 90° Sector	657.00	
PD10228	142		Downtilt Kit	131.00	Grps 1 & 2 Stocked
PD10236	113-114	820-900	11 dB Gain, 100° Sector	700.00	Stocked
PD10237	NL	820-900	10.75 dB Gain, 105° Sector	700.00	
PD10238	142		Mounting Bracket	79.00	
PD10238R	142		Mounting Bracket W/Retrofit Kit	100.00	

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PD10239	NL	824-894	8.5 dB Gain, 45° Sector	800.00	
PD10246-MT	115-116	820-900	14 dB Gain, 100°, W/Downtilt Kit	1611.00	
PD10266	87		CEL-1, Unity Gain, W/N295F Mount	165.00	Stocked
PD10267	87		CEL-1A, Unity Gain W/N295F Mount	165.00	
PD10268	87		CEL-3, 3 dB Gain W/N295F Mount	285.00	
PD10269	87		CEL-3S, 3 dB Gain W/N295F Mount	285.00	
PD10270	NL	824-894	Variable H Plane Panel Antenna	1300.00	
PD1107	NL	150-174*	3 dB Gain, Fiberglass Antenna	402.00	
PD1108	88-90	806-960*	5 dB Gain, Collinear Omni	1117.00	Standard Freq. Stocked
PD1109	88-90	806-960*	7.5 dB Gain, Collinear Omni	1175.00	Standard Freq. Stocked
PD1109E	88-90	824-894	7.5 dB Collinear Omni, Full Band	1175.00	Standard Freq. Stocked
PD1110	88-90	806-960*	9 dB Gain, Collinear Omni	1376.00	Standard Freq. Stocked
PD1110HW	88-90	806-952*	9 dB Gain, Collinear Omni Hi/Wind	1640.00	
PD1121	45-46	144-178*	3 dB Gain, Broadband Dipole	140.00	
PD1124	101-102	806-960*	9 dB Gain, Corner Reflector	440.00	Standard Freq. Stocked
PD1132R	NL	806-960*	16 dB Gain, Unidir. Collinear	2423.00	Standard Freq. Stocked
PD1132RD	NL	806-960*	16 dB Gain, Dual Directional	4783.00	
PD1136	NL	806-960*	10.5 dB Gain, Unidir. Collinear	2122.00	
PD1142-1	26-27	25-30	Unity Gain, Fiberglass	514.00	
PD1142-2A	26-27	30-35	Unity Gain, Fiberglass	472.00	
PD1142-2B	26-27	35-42	Unity Gain, Fiberglass	472.00	
PD1142-2C	26-27	42-54	Unity Gain, Fiberglass	472.00	
PD1142-3	26-27	66-88	Unity Gain, Fiberglass	433.00	
PD1147	175	136-174	Notch Cavity	401.00	
PD1148	175	406-512	Notch Cavity	401.00	
PD1150	59-60	406-512*	5 dB Gain, Super Stationmaster	557.00	Standard Freq. Stocked
PD1151	61-62	406-512*	8 dB Gain, Super Stationmaster	806.00	Standard Freq. Stocked
PD1153	175	406-512	Notch Cavity	401.00	Standard Freq. Stocked
PD1155	173-174	406-512	Pass Reject Cavity	391.00	
PD1157	199-200	406-512	Dual Notch Duplexer	2531.00	
PD1158D	32-33	150-174	12 dB Gain, Dual Yagi	882.00	
PD1158S	30-31	150-174	9 dB Gain, Single Yagi	356.00	
PD1167	38-39	144-174	3 dB Gain, Omni Fiberglass	537.00	
PD1185	167-168	66-88	Band Pass Cavity	1700.00	
PD1186	167-168	136-174	Band Pass Cavity	1550.00	
PD1187	167-168	406-512	Band Pass Cavity	1550.00	
PD1189-18	NL		RG393/U W/N(M) to N(M) 18"	65.00	Stocked
PD1189-36	NL		RG393/U W/N(M) to N(M) 36"	79.00	Stocked
PD1189-72	NL		RG393/U W/N(M) to N(M) 72"	99.00	
PD1189-96	NL		RG393/U W/N(M) to N(M) 96"	111.00	
PD1190-18	NL		RG393/U W/UHF(M) to UHF(F) 18"	72.00	
PD1190-36	NL		RG393/U W/UHF(M) to UHF(F) 36"	83.00	
PD1190-72	NL		RG393/U W/UHF(M) to UHF(F) 72"	104.00	
PD1190-96	NL		RG393/U W/UHF(M) to UHF(F) 96"	116.00	

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PD1191-18	NL		RG393/U W/UHF(M) to N(M) 18"	66.00	
PD1191-36	NL		RG393/U W/UHF(M) to N(M) 36"	80.00	
PD1191-72	NL		RG393/U W/UHF(M) to N(M) 72"	100.00	
PD1191-96	NL		RG393/U W/UHF(M) to N(M) 96"	112.00	
PD1255	142		Clamp Set & Bracket	60.00	
PD1256	NL		Conn. Attach Option 1-5/8" + 3"	18.00	
PD1259	NL		Conn. Attach Option - Air Cable	50.00	
PD128-1	19-21	25-29	Unity Monopole General Service	452.00	
PD128-1FT	19-21	25-29	Unity Monopole General Service	452.00	
PD128-2	19-21	30-39.5	Unity Monopole General Service	452.00	Standard Freq. Stocked
PD128-2A	19-21	39.75-54	Unity Monopole General Service	452.00	
PD128-2FT	19-21	30-54	Unity Monopole General Service	452.00	Standard Freq. Stocked
PD128-3	19-21	66-88	Unity Monopole General Service	406.00	
PD128-3FT	19-21	66-88	Unity Monopole General Service	406.00	
PD128-4	19-21	108-176	Unity Monopole General Service	336.00	Standard Freq. Stocked
PD128-4FT	19-21	108-176	Unity Monopole General Service	336.00	Standard Freq. Stocked
PD128-5	19-21	406-512	Unity Monopole General Service	253.00	Standard Freq. Stocked
PD128-5FT	19-21	406-512	Unity Monopole General Service	253.00	Standard Freq. Stocked
PD128-6	52-53	279-281	Unity Monopole General Service	336.00	
PD151	156		Rotary Cable Cutter	98.00	Stocked
PD152-4	34-35	108-174	Unity Gain, Ground Plane	359.00	
PD152-5	34-35	406-512	Unity Gain, Ground Plane	359.00	
PD156D-3	32-33	66-88	9.3 dB Gain, Dual Yagi	1389.00	
PD156D-4	32-33	144-174	9.3 dB Gain, Dual Yagi	573.00	
PD156S-3	30-31	66-88	7 dB Gain, Single Yagi	748.00	
PD156S-4	30-31	150-174	7 dB Gain, Single Yagi	285.00	
PD156S-5	52-53	279-281	7 dB Gain, Single Yagi	285.00	
PD1600	NL	150-174	Low Pass Harmonic Filter	411.00	
PD1601	NL	450-512	Low Pass Harmonic Filter	373.00	
PD1610	95	806-960*	3 dB Gain, Collinear Omni	398.00	Standard Freq. Stocked
PD176-514C	157		Cable Strap - 1/2"	2.00	
PD176-516C	157		Cable Strap - 7/8"	2.00	
PD200	42-43	120-174	5.8 dB Gain, Stationmaster	691.00	Standard Freq. Stocked
PD201	59-60	406-512*	5 dB Gain, Stationmaster	467.00	Standard Freq. Stocked
PD207-1	19-21	150-174	3 dB Gain, Monopole Cardioid	446.00	
PD207-2	52-53	279-281	3 dB Gain, Monopole Cardioid	416.00	
PD220	40-41	136-375*	5.25 dB Gain, Super Stationmaster	759.00	Standard Freq. Stocked
PD220DT	40-41	136-174*	5 dB Gain, Super Stationmaster	929.00	
PD237	142		Universal Crossover Plate	35.00	Stocked
PD241	141		Universal Clamp Set	43.00	Stocked
PD246	141		Universal Clamp Set	63.00	Stocked
PD255	NL		Weatherproof Housing (Pkg.10)	26.00	
PD275	156		Polyken Tape (Pkg.10)	28.00	Stocked
PD279	148	25-400	Power Divider Harness, 4-Way	281.00	

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PD302	144		Side Mounting Assembly (Short)	333.00	Stocked
PD303	144		Side Mounting Assembly (Long)	458.00	Stocked
PD315-2	28-29	30-54	3 dB Gain, Omni Collinear	2085.00	
PD315-3	28-29	66-88	3 dB Gain, Omni Collinear	1853.00	
PD320-1	22-23	30-39	2.5 dB Gain, Side Mount Single Bay	435.00	
PD320-2	22-23	40-54	2.5 dB Gain, Side Mount Single Bay	422.00	
PD320-3	22-23	66-88	2.5 dB Gain, Side Mount Single Bay	410.00	
PD322-1	22-23	30-39	2.5 -5 dB, Side Mount Two Bay	870.00	
PD322-2	22-23	40-54	2.5 -5 dB, Side Mount Two Bay	844.00	
PD322-3	22-23	66-88	2.5 -5 dB, Side Mount Two Bay	820.00	
PD324-1	22-23	30-39	5 -7.5 dB, Side Mount Four Bay	1749.00	
PD324-2	22-23	40-54	5 -7.5 dB, Side Mount Four Bay	1688.00	
PD324-3	22-23	66-88	5 -7.5 dB, Side Mount Four Bay	1640.00	
PD340	49-51	140-285*	6 dB Gain, Broadband Dipole Array	760.00	Standard Freq. Stocked
PD340LSP	49-51	140-285*	PD340 (Less Support Pipe)	600.00	
PD340TP	49-51	140-285*	PD340 (Two Piece)	860.00	Standard Freq. Stocked
PD344	45-46	148-174	4.5 dB Gain, Dipole With Director	260.00	
PD345	49-51	150-174*	3 dB Gain, Broadband Dual Array	855.00	
PD345LSP	49-51	150-174*	PD345 (Less Support Pipe)	770.00	
PD345TP	49-51	150-174*	PD345 (Two Piece)	920.00	
PD346	141		Heavy Duty Clamp Set	138.00	Stocked
PD370-18	NL		RG8A/U W/UHF(M) to UHF(F) 18"	37.00	
PD370-36	NL		RG8A/U W/UHF(M) to UHF(F) 36"	42.00	
PD370-72	NL		RG8A/U W/UHF(M) to UHF(F) 72"	45.00	
PD370-96	NL		RG8A/U W/UHF(M) to UHF(F) 96"	47.00	
PD371-18	NL		RG8A/U W/N(M) to N(M) 18"	35.00	Stocked
PD371-36	NL		RG8A/U W/N(M) to N(M) 36"	37.00	
PD371-72	NL		RG8A/U W/N(M) to N(M) 72"	42.00	
PD371-96	NL		RG8A/U W/N(M) to N(M) 96"	44.00	
PD374-18	NL		RG8A/U W/UHF(M) to N(M) 18"	33.00	
PD374-36	NL		RG8A/U W/UHF(M) to N(M) 36"	37.00	
PD374-72	NL		RG8A/U W/UHF(M) to N(M) 72"	42.00	
PD374-96	NL		RG8A/U W/UHF(M) to N(M) 96"	44.00	
PD390D	32-33	144-225*	11 dB Gain, Dual Yagi	707.00	
PD390S	30-31	144-225*	8 dB Gain, Single Yagi	310.00	
PD395	156		Lightning Arrestor Type N Female	52.00	Stocked
PD400	61-62	406-512*	7.5 dB Gain, Stationmaster	646.00	Standard Freq. Stocked
PD402	143		Side Mounting Assembly (Short)	244.00	Stocked
PD403	143		Side Mounting Assembly (Long)	309.00	Stocked
PD440	49-51	140-174*	3 dB Gain, Broadband Dipole Array	485.00	Standard Freq. Stocked
PD440LSP	49-51	140-174*	PD440 (Less Support Pipe)	423.00	
PD453	34-35	108-174*	Unity Broadband Ground Plane	400.00	
PD455	65-66	406-512*	10 dB Gain, Super Stationmaster	996.00	Standard Freq. Stocked
PD455DT	65-66	406-512	9.5 dB Gain, Super Stationmaster	1212.00	

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PD458	63-64	406-512*	8 dB Gain, Broadband Storm Chief	1154.00	Standard Freq. Stocked
PD458K	63-64	406-512*	8 dB, Broadband Hi/Pwr Storm Chief	1483.00	
PD46	141		Universal Clamp Set	44.00	Stocked
PD46A	141		Clamp Set	35.00	Stocked
PD477	156		Cable Grounding Clamp (Pkg.3)	36.00	Stocked
PD497-0	199-200	66-88	Dual Notch Duplexer	3600.00	
PD497-1	199-200	136-174	Dual Notch Duplexer	3000.00	
PD500-0	171-172	66-88	Band Pass Cavity	518.00	
PD500-0S	171-172	88-118	Band Pass Cavity	509.00	
PD500-1S	171-172	118-136	Band Pass Cavity	372.00	
PD500-2	171-172	200-300	Band Pass Cavity	352.00	
PD500-3	171-172	300-406	Band Pass Cavity	332.00	
PD500-4	171-172	406-512	Band Pass Cavity	322.00	Standard Freq. Stocked
PD500-8	171-172	806-960	Band Pass Cavity	305.00	Standard Freq. Stocked
PD5013-A	169-170	440-512	8" UHF Band Pass Cavity	686.00	
PD5013-B	169-170	148-174	8" VHF Band Pass Cavity	686.00	
PD5013-E	169-170	275-300	8" Band Pass Cavity	686.00	
PD502	143		Side Mounting Assembly (Short)	233.00	Stocked
PD503	144		Side Mounting Assembly (Long)	440.00	Stocked
PD504	143		Side Mounting Assembly (Long)	300.00	Stocked
PD5042	207	138-225*	Dual Notch Duplexer	3465.00	
PD5043-8	215-216	806-960	Band Pass Duplexer	2647.00	
PD5044-4	178-179	406-512	Band Pass Filter	1435.00	
PD5044-8	178-179	806-960	Band Pass Filter	1322.00	
PD505-0	173-174	66-88	Pass Reject Cavity	581.00	
PD505-1	173-174	136-174	Pass Reject Cavity	484.00	
PD505-4	173-174	406-512	Pass Reject Cavity	315.00	
PD506-0	197-198	66-88	Dual Notch Duplexer	2239.00	
PD506-1	197-198	136-174	Dual Notch Duplexer	1790.00	
PD506-2	197-198	220-225	Dual Notch Duplexer	1717.00	
PD506270	233		Power Supply (28 VDC)	259.00	
PD506290	233		Power Supply (120VAC/28VDC)	360.00	
PD5078	218	896-960	Telemetry Duplexer 6 Cavity	331.00	Standard Freq. Stocked
PD5079	218	896-960	Telemetry Duplexer 4 Cavity	248.00	Standard Freq. Stocked
PD508000	289		Cable Set for Cabinet	88.00	
PD5085	201-202	138-174*	Compact Duplexer	825.00	
PD5090	171-172	136-174*	Bandpass Cavity	363.00	
PD5090-2A	171-172	216-226	Bandpass Cavity	363.00	
PD5090-2B/3	171-172	218-219	Bandpass Filter	1566.00	
PD5091	173-174	136-174*	Pass Notch Cavity	381.00	
PD5094-14BA	185	835-849	Rx Filter	878.00	
PD5102-6-4NF	180-181	450-470	Combline Receive Filter	914.00	
PD5102-6-4NFD	180-181	450-470	Dual Combline Receive Filter	1888.00	
PD5122-10	182	890-960	Combline Filter	1080.00	

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PD5134-10	182	806-866	Combline Filter	1327.00	Standard Freq. Stocked
PD5134-10T	182	851-866	Combline Filter	641.00	
PD5134-18	182	806-869	Combline Filter	1327.00	Standard Freq. Stocked
PD5182-1	188	896-902	Combline Bandpass Filter	1112.00	
PD5185-2	186	835-849	E AMPS Filter, Wireline	3565.00	
PD5188-14	217	824-894	Duplexer, Wireline	1337.00	Standard Freq. Stocked
PD5188-25	217	824-894	Duplexer, Non-Wireline	1392.00	Standard Freq. Stocked
PD5192-14L	183-184	880-894	Tx Filter, Wireline	1217.00	
PD5192-14N	183-184	880-894	Tx Filter, Wireline	1098.00	
PD5192-25L	183-184	869-894	Tx Filter, Non-Wireline	1217.00	
PD5192-25N	183-184	869-894	Tx Filter, Non-Wireline	1098.00	
PD5195-1	186	824-846.5	E AMPS Filter, Non-Wireline	3565.00	
PD5198	187	835-849	Bandpass Filter	852.00	
PD5200	224		RMC Distribution Tray	690.00	
PD526	210	406-512*	Dual Notch Duplexer	1329.00	
PD526-SR	210	406-512*	Dual Notch Duplexer W/Reverse Mnt.	1329.00	
PD5279	NL	216-226	Dual Notch Cavity	525.00	
PD543000	289		System Cabinet 70"x 22"x 22"	1500.00	
PD543050	289		System Cabinet 78"x 22"x 22"	1900.00	
PD543740	289		Open Rack 73-3/8"x 20-7/8"x 26"	548.00	
PD543860	289		Open Rack 64-5/8"x 20-7/8"x 26"	424.00	
PD555	44, 67		Reflector Assy for PD220	192.00	Stocked
PD556	144		Side Mounting Assembly (Short)	306.00	Stocked
PD561	145		Side Mount Assy for PD620,PD755	588.00	Stocked
PD568	44, 67		Reflector Assy for PD455,PD400	171.00	Stocked
PD593	156		Lightning Arrestor UHF(F)	30.00	Stocked
PD620	40-41	136-174*	5.25 dB, Super Stationmaster HD	1704.00	Standard Freq. Stocked
PD620DT	40-41	136-174*	5 dB Gain, Super Stationmaster HD	1961.00	
PD633-6A	208-209	355-512*	UHF Mobile Duplexer, 6 Cavity	342.00	Standard Freq. Stocked
PD633-A	208-209	406-512*	UHF Mobile Duplexer, 4 Cavity	261.00	Standard Freq. Stocked
PD636-6A	205-206	144-174*	VHF Mobile Duplexer, 6 Cavity	380.00	Standard Freq. Stocked
PD636-A	205-206	144-174*	VHF Mobile Duplexer, 4 Cavity	269.00	Standard Freq. Stocked
PD638	201-202	406-470	Compact Base Station Duplexer	454.00	
PD638-6-0	201-202	66-88	Compact Base Station Duplexer	943.00	
PD638-6-1	201-202	150-174	Compact Base Station Duplexer	943.00	
PD638-6-2	201-202	220-225	Compact Base Station Duplexer	864.00	
PD638-6-4	201-202	406-470	Compact Base Station Duplexer	807.00	
PD638-6-5	201-202	470-512	Compact Base Station Duplexer	864.00	
PD640000	233	146-174	Single Stage 150 MHz Amplifier	829.00	
PD640060	233	806-960	Single Stage 800 MHz Amplifier	621.00	
PD640080	233	806-960	Dual Stage 800 MHz Amplifier	1358.00	
PD640240	233	806-960	Single Stage 800 MHz Amplifier	969.00	
PD640290	233	806-920	Dual Amplifier With Hybrid	1442.00	
PD644	167-168	30-39	Bandpass Cavity	1441.00	

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PD645	167-168	39-50	Bandpass Cavity	1441.00	
PD654	47-48	140-174*	9 dB Gain, Broadband Dipole Array	2193.00	
PD654-FP	47-48	150-174*	PD654 (Four Piece)	2562.00	
PD656130	233	66-88	Amplifier and Wire Assy	974.00	
PD656140	233	406-512	Amplifier and Wire Assy	871.00	
PD656210	234	806-1000	4-Port RMC Expansion Kit	217.00	
PD656220	234	806-1000	8-Port RMC Expansion Kit	435.00	
PD656230	257	806-1000	3/4 Wave TJD Exp. Kit 1 Channel	1241.00	
PD656250	257	806-1000	3/4 Wave TJD Exp. Kit 1 Channel	1109.00	
PD656270	234	806-1000	RMC Divider Bracket Kit	34.00	
PD656520	234	20-512	4 Way Divider W/Cable	239.00	
PD656650	234	20-512	8 Way Divider W/Cable	477.00	
PD656940	257	851-866	Expansion Kit for SJ	133.00	
PD671	44		Reflector Assy for PD201	93.00	Stocked
PD688D	68-69	406-512*	13 dB Gain, Dual Yagi	616.00	
PD688S	68-69	406-512*	10 dB Gain, Single Yagi	265.00	Standard Freq. Stocked
PD695	173-174	406-512	Pass Reject Cavity	257.00	
PD696	211-212	406-512*	Dual Notch Duplexer	1027.00	
PD696-SR	211-212	406-512*	Dual Notch Duplexer Reverse Mt.	1027.00	
PD755	65-66	406-512*	10 dB Gain, Super Stationmaster	1877.00	
PD755DT	65-66	406-512*	9.5 dB Gain, Super Stationmaster	2009.00	
PD7660	213-214	430-470	Miniplexer Duplexer, 6 Cavity	400.00	Standard Freq. Stocked
PD7722	287-288	20-512	Low Power Isolated Power Divider	200.00	
PD7724	287-288	20-512	Low Power Isolated Power Divider	112.00	
PD7725	287-288		Low Power Isolated Power Divider	125.00	
PD7726	287-288	20-512	Low Power Isolated Power Divider	250.00	
PD7727	287-288	800-960	Low Power Isolated Power Divider	112.00	
PD7848	287-288	800-960	Low Power Isolated Power Divider	190.00	
PD7849	287-288	800-960	Low Power Isolated Power Divider	225.00	
PD8011	287-288	800-960	Low Power Isolated Power Divider	108.00	
PD821-M	18	806-896	3 dB Glass Advantage Mini UHF	55.00	Standard Freq. Stocked
PD821-M/25	18	806-896	3 dB Glass Advantage Mini UHF 25/P	1350.00	Standard Freq. Stocked
PD821-T	18	806-896	3 dB Glass Advantage TNC	55.00	Standard Freq. Stocked
PD821-T/25	18	806-896	3 dB Glass Advantage TNC 25/Per	1350.00	Standard Freq. Stocked
PD83-1	24-25	25-29.75	Unity Coaxial General Service	591.00	
PD83-2	24-25	30-39.75	Unity Coaxial General Service	510.00	
PD83-3	24-25	40-50	Unity Coaxial General Service	492.00	
PD83-4	24-25	70-76	Unity Coaxial General Service	421.00	
PD83-5	24-25	144-175	Unity Coaxial General Service	364.00	
PD834E	24-25	806-821	Low Power Isolated Power Divider	291.00	
PD83A-1	24-25	25-29.75	Unity Coaxial General Service SS	637.00	
PD83A-2	24-25	30-39.75	Unity Coaxial General Service SS	568.00	
PD83A-3	24-25	40-50	Unity Coaxial General Service SS	550.00	
PD83A-4	24-25	70-76	Unity Coaxial General Service SS	480.00	

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PD83A-5	24-25	144-175	Unity Coaxial General Service SS	421.00	
PD8413	287-288	806-920	Low Power Isolated Power Divider	335.00	
PD861C	287-288	800-960	Low Power Isolated Power Divider	166.00	
PD867A	287-288	450-512	Low Power Isolated Power Divider	344.00	
PD872	287-288	2-520	Low Power Isolated Power Divider	200.00	
PD89	141		Universal Clamp Set	24.00	Stocked
PD8913	287-288	800-960	Low Power Isolated Power Divider	168.00	
PD895	173-174	806-960	Pass Reject Cavity	223.00	
PD896	211-212	806-960	Dual Notch Duplexer	1143.00	
PD896-SR	211-212	806-960	Dual Notch Duplexer Reverse Mt.	1143.00	
PD900-M	18	870-960	3 dB Glass Advantage Mini UHF	55.00	
PD900-M/25	18	870-960	3 dB Glass Advantage Mini UHF 25/P	1350.00	
PD900-T	18	870-960	3 dB Glass Advantage TNC	55.00	
PD900-T/25	18	870-960	3 dB Glass Advantage TNC 25/Per	1350.00	
PD90018	145		Ins. Adj. Upper Support (Short)	161.00	
PD90019	145		Ins. Adj. Upper Support (Long)	173.00	
PD901-PB4	176-177	66-88*	Compact Preselector	404.00	
PD911-PB4	176-177	144-174*	Compact Preselector	284.00	
PD941-PB4	176-177	406-474*	Compact Preselector	266.00	
PD951-PB4	176-177	474-512*	Compact Preselector	266.00	
PF782	271-272	66-88	Low Power Amplifier, 16.5 dB Gain	352.00	
PF805H	271-272	806-920	Low Power AMP., 10 - 32 dB Gain	480.00	
PF829	271-272	406-512	Low Power Amplifier, 16.5 dB Gain	403.00	
PF833	271-272	806-920	Low Power Amplifier, 26.5 dB Gain	586.00	
PF845G	271-272	806-821	Low Power Amplifier, 18 dB Gain	1023.00	
PF849F	271-272	821-851	Low Power Amplifier, 16.5 dB Gain	380.00	
PF861E	271-272	806-920	Low Power Amplifier, 16.5 dB Gain	416.00	
PF865	271-272	30-400	Low Power Amplifier, 16.5 dB Gain	420.00	
PF869E	271-272	406-512	Low Power Amplifier, 18.5 dB Gain	416.00	
PF884A4	271-272	450-470	Low Power Amplifier, 16 dB Gain	380.00	
PF892B	271-272	175-225	Low Power Amplifier, 16.5 dB Gain	420.00	
PF9208A	271-272	136-174	Low Power Amplifier, 16.5 dB Gain	352.00	
PHC078-B	NL	66-88	Isolation Panel, 60 Watt	1623.00	
PHC078-C	NL	66-88	Isolation Panel, 150 Watt	1758.00	
PHC078-H	NL	66-88	Isolation Panel, 300 Watt	1975.00	
PHC078-S	NL	66-88	Isolation Panel, 60 Watt Sensed	1650.00	
PHC150-B	NL	136-174	Isolation Panel, 60 Watt	1650.00	
PHC150-C	NL	136-174	Isolation Panel, 150 Watt	1785.00	
PHC150-H	NL	136-174	Isolation Panel, 300 Watt	2001.00	
PHC150-S	NL	136-174	Isolation Panel, 60 Watt Sensed	1677.00	
PHC460-B	NL	406-512	Isolation Panel, 60 Watt	1028.00	
PHC460-C	NL	406-512	Isolation Panel, 150 Watt	1163.00	
PHC460-H	NL	406-512	Isolation Panel, 300 Watt	1380.00	
PHC460-S	NL	406-512	Isolation Panel, 60 Watt Sensed	1055.00	

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PHC800-H	NL	806-1000	Isolation Panel, 300 Watt	1177.00	
PHD150-B	NL	136-174	Isolation Panel, 30 & 60 Watt	2975.00	
PHD150-C	NL	136-174	Isolation Panel, 30 & 150 Watt	3111.00	
PHD150-H	NL	136-174	Isolation Panel, 30 & 300 Watt	3327.00	
PHD150-S	NL	136-174	Isolation Panel, 30 & 60 W Sensed	3003.00	
PHD460-B	NL	406-512	Isolation Panel, 30 & 60 Watt	1731.00	
PHD460-C	NL	406-512	Isolation Panel, 30 & 150 Watt	1867.00	
PHD460-H	NL	406-512	Isolation Panel, 30 & 300 Watt	2083.00	
PHD460-S	NL	406-512	Isolation Panel, 30 & 60 W Sensed	1758.00	
PHD800-B	NL	806-1000	Isolation Panel, 30 & 60 Watt	1347.00	
PHD800-C	NL	806-1000	Isolation Panel, 30 & 150 Watt	1480.00	
PHD800-H	NL	806-1000	Isolation Panel, 30 & 300 Watt	1692.00	
PHH150	NL	136-174	2 Channel Coupler, 300 Watt	1077.00	
PHH460	NL	406-512	2 Channel Coupler, 300 Watt	1077.00	
PHH800	NL	800-1000	2 Channel Coupler, 300 Watt	854.00	
PL-258	NL		Connector Barrel UHF Female	7.00	
PL-259T	NL		Teflon Insulated UHF Male Conn.	7.00	
RG-214/U	NL		Coaxial Cable, Double Shielded	5.00	
RG-8A/U	NL		Coaxial Cable	1.60	
RG393/U	NL		Coaxial Cable, Teflon Dielectric	17.00	
RMC070-12	221-223	66-88	Multicoupler, 12 Channels	2277.00	
RMC070-16	221-223	66-88	Multicoupler, 16 Channels	2515.00	
RMC070-4	221-223	66-88	Multicoupler, 4 Channels	1692.00	
RMC070-8	221-223	66-88	Multicoupler, 8 Channels	2068.00	
RMC150-12	221-223	136-174	Multicoupler, 12 Channels	2182.00	
RMC150-16	221-223	136-174	Multicoupler, 16 Channels	2450.00	
RMC150-4	221-223	136-174	Multicoupler, 4 Channels	1692.00	
RMC150-8	221-223	136-174	Multicoupler, 8 Channels	1952.00	
RMC360-4	NL	345-345.5	Receiver Multicoupler, 220V	1706.00	
RMC360-8	NL	356-356.95	Receiver Multicoupler, 220V	1976.00	
RMC406-12	221-223	406-450	Receiver Multicoupler, 12 Channels	2194.00	
RMC406-16	221-223	406-450	Receiver Multicoupler, 16 Channels	2463.00	
RMC406-4	221-223	406-450	Receiver Multicoupler, 4 Channels	1706.00	
RMC406-8	221-223	406-450	Receiver Multicoupler, 8 Channels	1976.00	
RMC460-12	221-223	406-512	Multicoupler, 12 Channels	2194.00	
RMC460-16	221-223	406-512	Multicoupler, 16 Channels	2463.00	
RMC460-4	221-223	406-512	Multicoupler, 4 Channels	1706.00	
RMC460-8	221-223	406-512	Multicoupler, 8 Channels	1976.00	
RMC800-12	230-232	806-824	Multicoupler, 12 Channels	3117.00	Standard Freq. Stocked
RMC800-12A	228-229	806-824	Multicoupler, 12 Channels	3986.00	Standard Freq. Stocked
RMC800-12K	228-229	806-824	Multicoupler, 12 Channels	5178.00	Standard Freq. Stocked
RMC800-16	230-232	806-824	Multicoupler, 16 Channels	3399.00	
RMC800-20	230-232	806-824	Multicoupler, 20 Channels	3824.00	
RMC800-24	230-232	806-824	Multicoupler, 24 Channels	4086.00	Standard Freq. Stocked

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RMC800-24A	228-229	806-824	Multicoupler, 24 Channels	4593.00	Standard Freq. Stocked
RMC800-24K	228-229	806-824	Multicoupler, 24 Channels	6393.00	Standard Freq. Stocked
RMC800-28	230-232	806-824	Multicoupler, 28 Channels	4348.00	
RMC800-32	230-232	806-824	Multicoupler, 32 Channels	4617.00	
RMC800-4	230-232	806-824	Multicoupler, 4 Channels	2387.00	
RMC800-4N	230-232	806-824	Multicoupler, 4 Channels	1461.00	
RMC800-64	230-232	806-824	Multicoupler, 64 Channels	7918.00	
RMC800-8	230-232	806-824	Multicoupler, 8 Channels	2662.00	Stocked
RMC800-8N	230-232	806-824	Multicoupler, 8 Channels	1700.00	Stocked
RMC836-16K	226-227	824-846.5	Multicoupler, 16 Channels Tower Mt	5429.00	
RMC836-32N24V	224-225	824-846.5	Multicoupler, 32 Channels Non-Wire	3949.00	
RMC836-32N24V-8	224-225	824-846.5	Multicoupler, 32 Channels Non-Wire	4436.00	
RMC842-16K	226-227	835-849	Multicoupler, 16 Channels Tower Mt	5429.00	
RMC842-32W24V	224-225	835-849	Multicoupler, 32 Channels Wireline	3949.00	
RMC842-32W24V-8	224-225	835-849	Multicoupler, 32 Channels Wireline	4436.00	
RMC900-10	230-232	890-915	Multicoupler, 10 Channels	2807.00	
RMC900-10K	228-229	890-915	Multicoupler, 10 Channels	5293.00	
RMC900-20	230-232	890-915	Multicoupler, 20 Channels	3414.00	
RMC900-20K	228-229	890-915	Multicoupler, 20 Channels	6508.00	
RSA880-12	245	869-894	12 Ch. High Power Cellular Combiner		Contact Sales for Pricing
RSA880-16	245	869-894	16 Ch. High Power Cellular Combiner		Contact Sales for Pricing
RSA880-4	245	869-894	4 Ch. High Power Cellular Combiner		Contact Sales for Pricing
RSA880-8	245	869-894	8 Ch. High Power Cellular Combiner		Contact Sales for Pricing
SJC880-5CS	NL	840-960	SMR Combiner, 5 Channels Hi-Power	5357.00	
SJC880-5CT	NL	840-960	SMR Combiner, 5 Channels	4694.00	
SJD880-5CS	NL	840-960	SMR Combiner, 5 Channels Hi-Power	6550.00	
SJD880-5CT	NL	840-960	SMR Combiner, 5 Channels	5887.00	
SJD880-5T	NL	806-1000	Integrated Combiner, 5 Channels	5887.00	
SJT880-5CS	NL	840-960	SMR Combiner, 5 Channels Hi-Power	8036.00	
SJT880-5CT	NL	840-960	SMR Combiner, 5 Channels	7373.00	
SKD940-4H	260-261	925-940	Hi Power Waveguide Combiner, 350W	8800.00	
SKD940-5H	260-261	925-940	Hi Power Waveguide Combiner, 350W	11084.00	
SM880-12	246-247	851-960	12 Ch. Compact Tx Comb. W/O Isolat	7357.00	
SM880-16	246-247	851-960	16 Ch. Compact Tx Comb. W/O Isolat	10003.00	
SM880-4	246-247	851-960	4 Ch. Compact Tx Combiner W/O Isol	2589.00	
SM880-8	246-247	851-960	8 Ch. Compact Tx Combiner W/O Isol	4949.00	
SMC880-12	246-247	851-960	12 Ch. Compact Cell. Tx Combiner	10417.00	
SMC880-16	246-247	851-960	16 Ch. Compact Cell. Tx Combiner	14083.00	
SMC880-4	246-247	851-960	4 Ch. Compact Cellular Tx Combiner	3437.00	
SMC880-8	246-247	851-960	8 Ch. Compact Cellular Tx Combiner	6989.00	
TI90	256	935-960	Compact Cavity Combiner Series	7200.00	
TBC078-2	237-239	66-88	Hybrid Combiner, 2 Channels	1839.00	
TBC078-4	237-239	66-88	Hybrid Combiner, 4 Channels	4436.00	
TBC150-2	237-239	136-174	Hybrid Combiner, 2 Channels	1839.00	

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P= See available options for PENETRATOR™ Series • *= Add dash to model number for frequency bands

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International
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FAX: 1-602-256-2632

Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
TBC150-4	237-239	136-174	Hybrid Combiner, 4 Channels	4436.00	
TBC460-2	237-239	406-512	Hybrid Combiner, 2 Channels	1839.00	
TBC460-4	237-239	406-512	Hybrid Combiner, 4 Channels	4436.00	
TBC800-2	237-239	806-1000	Hybrid Combiner, 2 Channels	1316.00	
TBC800-4	237-239	806-1000	Hybrid Combiner, 4 Channels	3137.00	
TBD078-2	237-239	66-88	Hybrid Combiner, 2 Channels	2576.00	
TBD078-4	237-239	66-88	Hybrid Combiner, 4 Channels	5908.00	
TBD150-2	237-239	136-174	Hybrid Combiner, 2 Channels	2576.00	
TBD150-4	237-239	136-174	Hybrid Combiner, 4 Channels	5908.00	
TBD460-2	240-242	406-512	Hybrid Combiner, 2 Channels	2576.00	
TBD460-4	240-242	406-512	Hybrid Combiner, 4 Channels	5908.00	
TBD800-2	240-242	806-1000	Hybrid Combiner, 2 Channels	1878.00	
TBD800-4	240-242	806-1000	Hybrid Combiner, 4 Channels	4262.00	
TCC078-2	237-239	66-88	Hybrid Combiner, 2 Channels	2029.00	
TCC078-4	237-239	66-88	Hybrid Combiner, 4 Channels	4891.00	
TCC150-2	237-239	136-174	Hybrid Combiner, 2 Channels	2029.00	
TCC150-3A	237-239	136-174	Hybrid Combiner, 3 Channels	3603.00	
TCC150-3S	237-239	136-174	Hybrid Combiner, 3 Channels	4436.00	
TCC150-4	237-239	136-174	Hybrid Combiner, 4 Channels	4891.00	
TCC460-2	240-242	406-512	Hybrid Combiner, 2 Channels	2029.00	
TCC460-3A	240-242	406-512	Hybrid Combiner, 3 Channels	3603.00	
TCC460-3S	240-242	406-512	Hybrid Combiner, 3 Channels	4436.00	
TCC460-4	240-242	406-512	Hybrid Combiner, 4 Channels	4891.00	
TCC800-2	240-242	806-1000	Hybrid Combiner, 2 Channels	1501.00	
TCC800-3A	240-242	806-1000	Hybrid Combiner, 3 Channels	2715.00	
TCC800-3S	240-242	806-1000	Hybrid Combiner, 3 Channels	3221.00	
TCC800-4	240-242	806-1000	Hybrid Combiner, 4 Channels	3582.00	
TCD078-2	237-239	66-88	Hybrid Combiner, 2 Channels	2759.00	
TCD078-4	237-239	66-88	Hybrid Combiner, 4 Channels	6286.00	
TCD150-2	237-239	136-174	Hybrid Combiner, 2 Channels	2759.00	
TCD150-3A	237-239	136-174	Hybrid Combiner, 3 Channels	4675.00	
TCD150-3S	237-239	136-174	Hybrid Combiner, 3 Channels	5508.00	
TCD150-4	237-239	136-174	Hybrid Combiner, 4 Channels	6286.00	
TCD460-2	240-242	406-512	Hybrid Combiner, 2 Channels	2764.00	
TCD460-3A	240-242	406-512	Hybrid Combiner, 3 Channels	4675.00	
TCD460-3S	240-242	406-512	Hybrid Combiner, 3 Channels	5508.00	
TCD460-4	240-242	406-512	Hybrid Combiner, 4 Channels	6286.00	
TCD800-2	240-242	806-1000	Hybrid Combiner, 2 Channels	2063.00	
TCD800-3A	240-242	806-1000	Hybrid Combiner, 3 Channels	3527.00	
TCD800-3S	240-242	806-1000	Hybrid Combiner, 3 Channels	4033.00	
TCD800-4	240-242	806-1000	Hybrid Combiner, 4 Channels	4633.00	
TCD900-5	243	806-960	Hybrid Combiner, 5 Channels	5887.00	
TH1811-1	262	1805-1880	1 Channel Wideband Combiner		Contact Sales for Pricing
TH1821-1	262	1805-1880	2 Channel Wideband Combiner		Contact Sales for Pricing

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
TH1841-1	262	1805-1880	4 Channel Wideband Combiner		Contact Sales for Pricing
TH1921-1	262	1930-1990	2 Channel Wideband Combiner	5335.00	
TH9011-1	244	925-960	1 Channel Wideband Combiner	4270.00	
TH9021-1	244	935-960	2 Channel Wideband Combiner	5335.00	
TH9021-2	244	925-960	2 Channel Wideband Combiner		Contact Sales for Pricing
THC150-2	237-239	136-174	Hybrid Combiner, 2 Channels	4328.00	
THC150-3A	237-239	136-174	Hybrid Combiner, 3 Channels	7223.00	
THC150-3S	237-239	136-174	Hybrid Combiner, 3 Channels	8305.00	
THC150-4	237-239	136-174	Hybrid Combiner, 4 Channels	9738.00	
THC460-2	240-242	406-512	Hybrid Combiner, 2 Channels	2813.00	
THC460-3A	240-242	406-512	Hybrid Combiner, 3 Channels	3841.00	
THC460-3S	240-242	406-512	Hybrid Combiner, 3 Channels	4924.00	
THC460-4	240-242	406-512	Hybrid Combiner, 4 Channels	5734.00	
THC800-2	240-242	806-1000	Hybrid Combiner, 2 Channels	2758.00	
THC800-4	240-242	806-1000	Hybrid Combiner, 4 Channels	5410.00	
THD150-2	237-239	136-174	Hybrid Combiner, 2 Channels	6979.00	
THD150-3A	237-239	136-174	Hybrid Combiner, 3 Channels	11199.00	
THD150-3S	237-239	136-174	Hybrid Combiner, 3 Channels	12281.00	
THD150-4	237-239	136-174	Hybrid Combiner, 4 Channels	15040.00	
THD460-2	240-242	406-512	Hybrid Combiner, 2 Channels	4220.00	
THD460-3A	240-242	406-512	Hybrid Combiner, 3 Channels	6925.00	
THD460-3S	240-242	406-512	Hybrid Combiner, 3 Channels	8007.00	
THD460-4	240-242	406-512	Hybrid Combiner, 4 Channels	9522.00	
THD800-2	240-242	806-1000	Hybrid Combiner, 2 Channels	3787.00	
THD800-4	240-242	806-1000	Hybrid Combiner, 4 Channels	8423.00	
TJC125-3T	248-252	118-136	Cavity Ferrite Combiner 6"	4004.00	
TJC125-4T	248-252	118-136	Cavity Ferrite Combiner, 6"	4978.00	
TJC150-10	248-252	150-174	Cavity Combiner, 10 Channels	11902.00	
TJC150-2	248-252	150-174	Cavity Combiner, 2 Channels	3029.00	
TJC150-3	248-252	150-174	Cavity Combiner, 3 Channels	4004.00	
TJC150-4	248-252	150-174	Cavity Combiner, 4 Channels	4978.00	
TJC150-5	248-252	150-174	Cavity Combiner, 5 Channels	5951.00	
TJD355-5T	253-255	345-365	Combiner Assembly, 5 Channels	7303.00	
TJC420-5	253-255	406-460	Cavity Ferrite Tx Combiner	5680.00	
TJC460-10	253-255	450-512	Cavity Combiner, 10 Channels	11361.00	
TJC460-2	253-255	450-512	Cavity Combiner, 2 Channels	2921.00	
TJC460-3	253-255	450-512	Cavity Combiner, 3 Channels	3841.00	
TJC460-4	253-255	450-512	Cavity Combiner, 4 Channels	4761.00	
TJC460-5	253-255	450-512	Cavity Combiner, 5 Channels	5680.00	
TJC800-10S	NL	806-1000	Cavity Combiner, 10 Channels	11934.00	
TJC800-10T	NL	806-1000	Cavity Combiner, 10 Channels	10608.00	
TJC800-2S	NL	806-1000	Cavity Combiner, 2 Channels	2960.00	
TJC800-2T	NL	806-1000	Cavity Combiner, 2 Channels	2695.00	
TJC800-3S	NL	806-1000	Cavity Combiner, 3 Channels	4195.00	

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
TJC800-3T	NL	806-1000	Cavity Combiner, 3 Channels	3511.00	
TJC800-4S	NL	806-1000	Cavity Combiner, 4 Channels	4858.00	
TJC800-4T	NL	806-1000	Cavity Combiner, 4 Channels	4328.00	
TJC800-5S	NL	806-1000	Cavity Combiner, 5 Channels	5808.00	
TJC800-5T	NL	806-1000	Cavity Combiner, 5 Channels	5145.00	
TJC880-8T	NL	806-1000	Cavity Combiner, 8 Channels	9273.00	
TJD140-2	248-252	136-150	Cavity Ferrite Combiner, 6"	3679.00	
TJD140-5	248-252	136-150	Cavity Ferrite Combiner, 6"	7575.00	
TJD150-10	248-252	150-174	Cavity Combiner, 10 Channels	15148.00	
TJD150-2	248-252	150-174	Cavity Combiner, 2 Channels	3679.00	
TJD150-3	248-252	150-174	Cavity Combiner, 3 Channels	4978.00	
TJD150-4	248-252	150-174	Cavity Combiner, 4 Channels	6276.00	
TJD150-5	248-252	150-174	Cavity Combiner, 5 Channels	7575.00	
TJD220-5T	248-252	220-250	220 MHz, Trunking Combiner	6859.00	
TJD285-4	248-252	251-322	Combiner, 4 Channels	6459.00	
TJD355-4T	253-255	345-365	Combiner Assy, 4 Channels	6435.00	
TJD355-5T	253-255	345-365	Combiner Assy, 5 Channels	7303.00	
TJD355-8T	253-255	345-365	Combiner Assy, 8 Channels	12870.00	
TJD460-10	253-255	450-512	Cavity Combiner, 10 Channels	14607.00	
TJD460-2	253-255	450-512	Cavity Combiner, 2 Channels	3571.00	
TJD460-2N	253-255	450-512	Cavity Combiner, 2 Channels	3679.00	
TJD460-3	253-255	450-512	Cavity Combiner, 3 Channels	4815.00	
TJD460-3N	253-255	450-512	Cavity Combiner, 3 Channels	4978.00	
TJD460-4	253-255	450-512	Cavity Combiner, 4 Channels	6059.00	
TJD460-4N	253-255	450-512	Cavity Combiner, 4 Channels	6276.00	
TJD460-5	253-255	450-512	Cavity Combiner, 5 Channels	7303.00	
TJD460-5N	253-255	450-512	Cavity Combiner, 5 Channels	7575.00	
TJD800-10T	NL	806-1000	Cavity Combiner, 10 Channels	12995.00	
TJD800-2S	NL	806-1000	Cavity Combiner, 2 Channels	3437.00	
TJD800-2T	NL	806-1000	Cavity Combiner, 2 Channels	3172.00	
TJD800-3S	NL	806-1000	Cavity Combiner, 3 Channels	4911.00	
TJD800-3T	NL	806-1000	Cavity Combiner, 3 Channels	4227.00	
TJD800-4S	NL	806-1000	Cavity Combiner, 4 Channels	5813.00	
TJD800-4T	NL	806-1000	Cavity Combiner, 4 Channels	5283.00	
TJD800-5S	NL	806-1000	Cavity Combiner, 5 Channels	7001.00	
TJD800-5T	NL	806-1000	Cavity Combiner, 5 Channels	6338.00	
TJD800-8S	NL	806-1000	Cavity Combiner, 8 Channels	11944.00	
TJD800-8T	NL	806-1000	Cavity Combiner, 8 Channels	10883.00	
TJD880-10S	NL	806-1000	Cavity Combiner, 10 Channels	14135.00	
TJT150-10	248-252	136-174	Cavity Combiner, 10 Channels	18395.00	
TJT150-2	248-252	136-174	Cavity Combiner, 2 Channels	4328.00	
TJT150-3	248-252	136-174	Cavity Combiner, 3 Channels	5951.00	
TJT150-4	248-252	136-174	Cavity Combiner, 4 Channels	7575.00	
TJT150-5	248-252	136-174	Cavity Combiner, 5 Channels	9197.00	

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
TJT460-10	253-255	450-512	Cavity Combiner, 10 Channels	17853.00	
TJT460-2	253-255	450-512	Cavity Combiner, 2 Channels	4220.00	
TJT460-3	253-255	450-512	Cavity Combiner, 3 Channels	5789.00	
TJT460-4	253-255	450-512	Cavity Combiner, 4 Channels	7357.00	
TJT460-5	253-255	450-512	Cavity Combiner, 5 Channels	8927.00	
TJT800-10S	NL	806-1000	Cavity Combiner, 10 Channels	16708.00	
TJT800-10T	NL	806-1000	Cavity Combiner, 10 Channels	15382.00	
TJT800-2S	NL	806-1000	Cavity Combiner, 2 Channels	3915.00	
TJT800-2T	NL	806-1000	Cavity Combiner, 2 Channels	3650.00	
TJT800-3S	NL	806-1000	Cavity Combiner, 3 Channels	5627.00	
TJT800-3T	NL	806-1000	Cavity Combiner, 3 Channels	4943.00	
TJT800-4S	NL	806-1000	Cavity Combiner, 4 Channels	6768.00	
TJT800-4T	NL	806-1000	Cavity Combiner, 4 Channels	6237.00	
TJT800-5S	NL	806-1000	Cavity Combiner, 5 Channels	8195.00	
TJT800-5T	NL	806-1000	Cavity Combiner, 5 Channels	7532.00	
TJT800-8S	NL	806-1000	Cavity Combiner, 8 Channels	13854.00	
TJT800-8T	NL	806-1000	Cavity Combiner, 8 Channels	12793.00	
TLC150-4	248-252	150-174	Cavity Combiner, 4 Channels	5605.00	
TLC150-8	248-252	150-174	Cavity Combiner, 8 Channels	11209.00	
TLC280-4	248-252	279-281	Cavity Combiner, 4 Channels	5605.00	
TLC425-4	253-255	406-460	Cavity Ferrite Tx Combiner	5605.00	
TLC460-4	253-255	450-512	Cavity Combiner, 4 Channels	5605.00	
TLC460-8	253-255	450-512	Cavity Combiner, 8 Channels	11209.00	
TLD140-4	248-252	136-150	Cavity Ferrite Combiner	6903.00	
TLD150-4	248-252	150-174	Cavity Combiner, 4 Channels	6903.00	
TLD150-8	248-252	150-174	Cavity Combiner, 8 Channels	13806.00	
TLD280-4	248-252	279-281	Cavity Combiner, 4 Channels	6903.00	
TLD425-4	253-255	406-460	Cavity Ferrite Tx Combiner	6903.00	
TLD460-4	253-255	450-512	Cavity Combiner, 4 Channels	6903.00	
TLD460-8	253-255	450-512	Cavity Combiner, 8 Channels	13806.00	
TLT150-4	248-252	150-174	Cavity Combiner, 4 Channels	8202.00	
TLT150-8	248-252	150-174	Cavity Combiner, 8 Channels	16403.00	
TLT460-4	253-255	450-512	Cavity Combiner, 4 Channels	8202.00	
TLT460-8	253-255	450-512	Cavity Combiner, 8 Channels	16403.00	
UG1185/U	NL		Type N Male Connector	7.00	Stocked
UG1186/U	NL		Type N Female Connector	11.00	
WJD860-10S	258-259		Combiner, 10 Ch. 860 MHz, 150W	13300.00	
WJD860-10T	258-259	851-869	Combiner, 10 Ch. 860 MHz 60 Watt	11970.00	
WJD860-15S	258-259		Combiner, 15 Ch. 860 MHz, 150W	20100.00	
WJD860-15T	258-259	851-869	Combiner, 15 Ch. 860 MHz, 60 Watt	18105.00	
WJD860-20S	258-259		Combiner, 20 Ch. 860 MHz, 150W	27200.00	
WJD860-20T	258-259	851-869	Combiner, 20 Ch. 860 MHz, 60 Watt	24540.00	
WJD860-4T	258-259	851-869	Combiner, 4 Ch. 860 MHz, 60 Watt	4568.00	
WJD860-5S	258-259		Combiner, 5 Ch. 860 MHz, 150W	6500.00	
WJD860-5T	258-259	851-869	Combiner, 5 Ch. 860 MHz, 60 Watt	5835.00	

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Model Number	Catalog Page	Frequency (MHz)	Description	List Price	Comments
INVERT OPTION	NL		Invert Option for Cellular Antenna	235.00	
OPTION C	NL		C Conn. to Replace Type-N	375.00	
OPTION E	NL		EIA Conn. to Replace Type-N	375.00	
OPTION S	NL		7/16" Conn. to Replace Type-N	375.00	
B1	NL		B1 Angle Mounting Bracket W/Hdwr	322.00	
J CABLE	NL		Option J Additional Tilt Cable	253.00	
OPTION C	NL		C Connector Termination 1000 Watt	400.00	
OPTION EIA	NL		7/8 EIA Flange 1000 Watt	400.00	
OPTION HW	NL		High Wind Rated	1500.00	
OPTION I	NL		Inverted Penetrator	300.00	
OPTION J	NL		Field Ajustable Beam Tilt	1500.00	
OPTION L	NL		Tailored Vertical Beam	1500.00	
OPTION LC	NL		LC Connector 1000 Watt	412.00	
OPTION K	NL		1000 Watt	400.00	

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5 YEAR WARRANTY

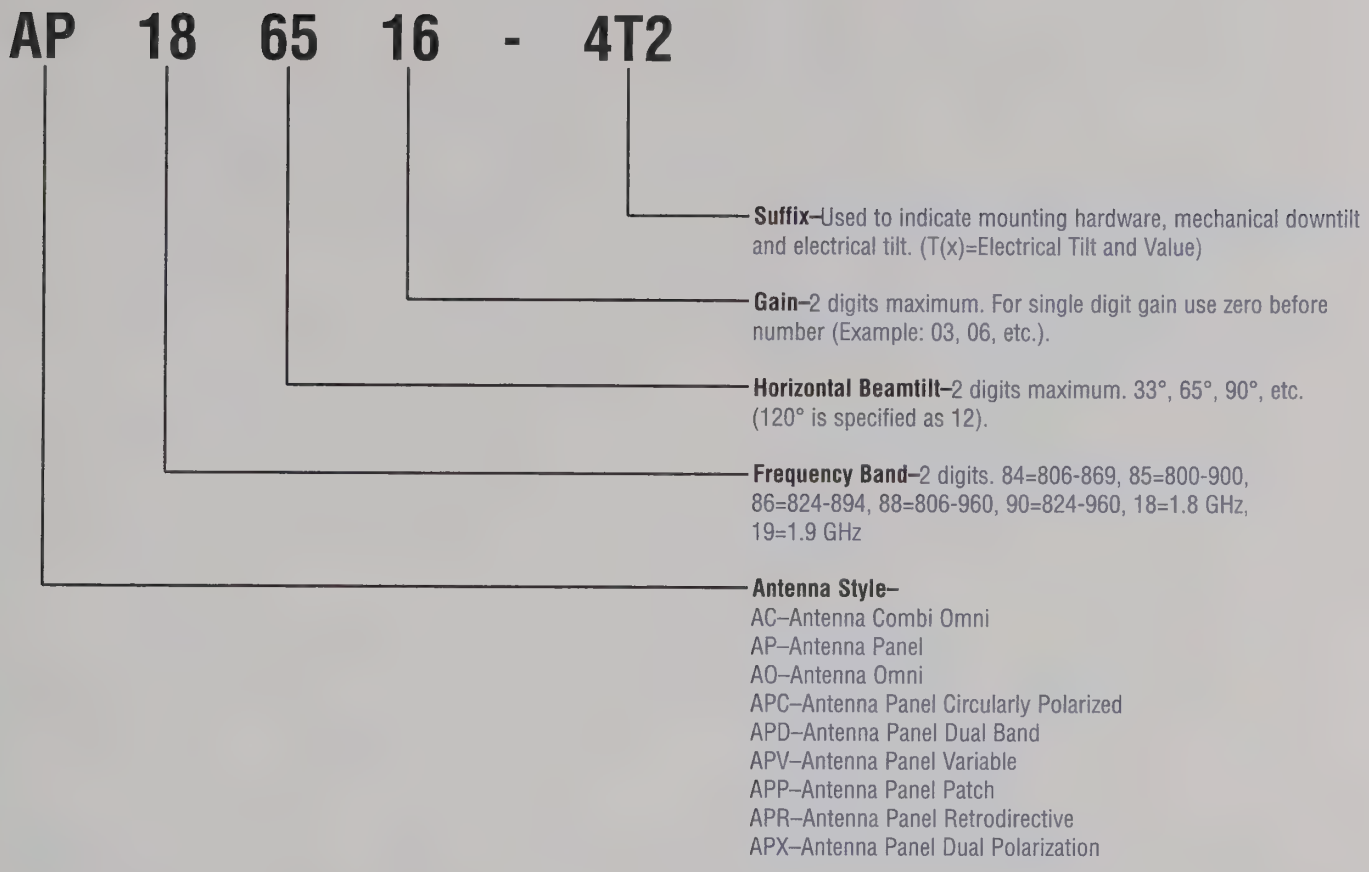
Our 5 year warranty on all base station antennas.

When Celwave ships you a base station antenna, it is guaranteed to be free from defects in materials or workmanship for five years. In the unlikely event it is not, we will repair or replace it.* No charge. No complications.

If you have a problem with any one of them - from monopole to Penetrator® - you will quickly discover our warranty is the best in the business.

*See full warranty on back cover.

New Numbering Structure for Celwave Antennas


AP 18 65 16 - 4T2
Suffix–Used to indicate mounting hardware, mechanical downtilt and electrical tilt. (T(x)=Electrical Tilt and Value)
Gain–2 digits maximum. For single digit gain use zero before number (Example: 03, 06, etc.).
Horizontal Beamtilt–2 digits maximum. 33°, 65°, 90°, etc. (120° is specified as 12).
Frequency Band–2 digits. 84=806-869, 85=800-900, 86=824-894, 88=806-960, 90=824-960, 18=1.8 GHz, 19=1.9 GHz
Antenna Style–
AC–Antenna Combi Omni
AP–Antenna Panel
AO–Antenna Omni
APC–Antenna Panel Circularly Polarized
APD–Antenna Panel Dual Band
APV–Antenna Panel Variable
APP–Antenna Panel Patch
APR–Antenna Panel Retrodirective
APX–Antenna Panel Dual Polarization

Celwave Regional Sales Managers

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Markham, ON L3R 9W9
Tel: (905) 940-5530 • Fax: (905) 940-6632

International

Celwave
1007 E. University, Phoenix, AZ 85034
Tel: (602) 252-8058 • Fax: (602) 256-2632

Celwave Sales Representatives

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   Tel: (908) 462-1880 • Fax: (908) 462-6919
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   9 Westlake Ct., Somerset, NJ 08873
   Tel: (908) 563-0366 • Fax: (908) 563-9174
3. **Communications Marketing Southeast, Inc.**
   P.O. Box 823, Marietta, GA 30061
   Tel: (404) 424-9097 • Fax: (404) 428-2124
4. **Communications Marketing Associates**
   9405 Groffs Mills Dr., Owings Mills, MD 21117-4888
   Tel: (800) 800-0041 • Fax: (410) 356-1188
5. **MacCom Inc.**
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   Tel: (305) 772-3025 • Fax: (305) 772-1919
6. **Dick Buss & Associates**
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   Tel: (608) 987-2100 • Fax: (608) 987-2431
7. **Nevco Marketing, Inc.**
   7645 N. Rhode Ave., Kansas City, MO 64152
   Tel: (816) 741-0601 • Fax: (816) 741-0813
8. **Capital Electronics Sales**
   230 E. Main Street, Plainfield, IN 46168
   Tel: (317) 839-5022 • Fax: (317) 839-2662
9. **Select Sales, Inc.**
   7750 West 78th St., Bloomington, MN 55439
   Tel: (612) 941-9388 • Fax: (612) 941-7376
10. **W.E. Price & Company**
    3030 Townline Rd., P.O. Box 306, Houghton Lake, MI 48629
    Tel: (517) 366-8702 • Fax: (517) 366-8495
11. **Thomas Shelby & Co., Inc.**
    309 South Park Dr., St. Mary's, OH 45885
    Tel: (419) 394-3377 • Fax: (419) 394-4815
12. **Vidoni & Kleiman**
    1180 Colorado Blvd., Denver, CO 80206
    Tel: (303) 333-7745 • Fax: (303) 333-7063
13. **Bert Moore & Associates**
    P.O. Box 680, North Hollywood, CA 91603
    Tel: (213) 877-5955 • Fax: (818) 980-4847
14. **Pentech Inc.**
    P.O. Box 749, Oregon City, OR 97045
    Tel: (800) 878-7377 • Fax: (503) 655-0781
15. **Martin-Cavender Co., Inc.**
    6440 N. Central Expressway, Suite #514
    P.O. Box 820667, Dallas, TX 75382
    Tel: (214) 363-3574 • Fax: (214) 369-9150
16. **PROCOMM Marketing, Inc.**
    655 Lewelling Blvd., #351, San Leandro, CA 94579
    Tel: (510) 352-9195 • Fax: (510) 293-1709
17. **ElectriComm, Inc.**
    4327 Kencrest Drive, Syracuse, NY 13215
    Tel: (315) 673-4343 • Fax: (315) 673-3337

U.S. and Canada
Phone: 1-800-321-4700
FAX: 1-615-641-1910

CELWAVE
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

International
Phone: 1-602-252-8058
FAX: 1-602-256-2632

Celwave Distributors

AF CommSupply
11500 W. 90th St., Overland Park, KS 66214
Tel: (800) 255-6222 • Fax: (913) 492-2948

Cartwright Communications Co.
7812 Red Sky Dr., Cincinnati, OH 45249-1696
Tel: (800) 543-8614

Communications Associates Co. (A Hutton Communications Co.)
305 N. Republic Ave., Joliet, IL 60434-2399
Tel: (800) 435-9313

Hutton Communications
4112 Billy Mitchell Dr., Dallas, TX 75244-2315
Dallas: (800) 442-3811
Altanta: (800) 741-3811
Denver: (800) 726-6245
Seattle: (800) 426-2964

Hutton Comm. of Canada, Inc.
24 The East Mall, Toronto, ON M8W 4W5
Tel: (416) 255-6063
Canada Only: (800) 265-8685

Electro-Comm Distributing Inc.
4950 Oakland St., Denver, CO 80239
Denver: (303) 371-8182
Tel: (800) 525-0173 • Fax: (303) 371-8158

Northwest Comm. Distributors
1976 Century Way, Boise, ID 83709
Tel: (800) 333-7409

Pulstar Distributing, Inc.
3520 International Dr., St. Paul, MN 55110
Tel: (800) 634-4246

Talley Communications Corp.
11824 East Hamden Place, Santa Fe Springs, CA 90670
Santa Fe Springs: (800) 949-7099
Hayward: (800) 223-4949
San Diego: (800) 949-7059
Phoenix: (800) 949-7069

Tessco
34 Loveton Circle, Sparks, MD 21152
Tel: (800) 472-7373

The Communications Express
P.O. Box 1158, Clifton, NJ 07014
Tel: (800) 631-7297 • Fax: (800) 522-4543

U.S. and Canada
Phone: 1-800-321-4700
FAX: 1-615-641-1910

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

International
Phone: 1-602-252-8058
FAX: 1-602-256-2632

PRICE LIST

Product Selection Guide, Catalog 195
Effective January 1, 1996

Terms and Condition of Sale

Prices:
Prices listed are F.O.B. Seller's plants and are subject to cha
without notice. Terms are net 30 days from date of invoice v
minimum order of $100.00. Prices include the cost of Stand
Domestic Packing. If Export Packing is required, an addition
will be made.

Credit Approval:
Orders are subject to the approval of Seller's Credit Departm
Call the Credit Department at 908-462-1880.

Shipments:
Shipments are made with transportation charges collect unl
otherwise specified by the Buyer. Buyer's routing is used wh
practicable. Shipments are routed according to the Seller's b
judgement unless carrier is specified by Buyer. The Seller is
responsible for selecting cheapest or fastest routing.

Acceptance of Order:
Orders are valid only when accepted at Seller's Marlboro, NJ
Nashville, TN office.

Quotations:
Only written quotations are valid.

Claims for Damage or Loss in Transit:
Claims for damage must be made within 30 days after date
shipment of material from Seller's plant. Call 1-800-321-470

Claims for Shortage:
Claims for shortages must be made within 30 days after dat
shipment of material from Seller's plants. Call 1-800-321-47

The Seller warrants that, at the time of shipment, the
manship. The Seller's obligation under this warranty is li
shipment, with the exception of base antennas only. The
applies to antennas manufactured after January 1, 1994.
Seller. Replacement or repair is made only after an exam
of manufacture. All shipping charges on the returned ma

The Seller is in no event liable for consequential dama
products manufactured by the Seller, whether used in ac
products damaged by lightning.

This warranty is in lieu of all others, either expressed
liability in connection with the Seller's products.

CE
DIVISION
2 Ryan F
Phone: 1-80

Printed in U.S.A.
Form 2010 895-20M

HOW TO CONTACT CELWAVE

TO PLACE AN ORDER:
IN NORTH AMERICA, MEXICO:

Tel: 1-800/321-4700
Fax: 1-615/641-1910

INTERNATIONAL:

Tel: 1-908/462-1880
Fax: 1-908/431-8388

TECHNICAL SUPPORT:

Tel: 800/659-1880
Fax: 1-908/462-6919

OR CALL...
1-800/CELWAVE

THE FOLLOWING INFORMATION IS REQUIRED

ANTENNA PRODUCTS

BASESTATION, MOBILE, AND PORTABLE ANTENNAS....
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

PENETRATOR...
Provide downtilt when non-standard or when ordering OPTION-J, OPTION-L, or J-CABLES

CAVITY/FILTER/DUPLEXER PRODUCTS

BANDPASS CAVITY...
Frequency (specified by item group)
Insertion loss

PASS-REJECT CAVITY...
Pass frequency
Reject frequency
Check Tx/Rx spacing (per catalog specified minimum spacing)

NOTCH CAVITY...
Provide reject frequency

BANDPASS FILTER...
Provide bandwidth
Beginning & End frequencies

DUPLEXER...
Transmit frequency
Receive frequency
Check Tx/Rx spacing (per catalog specified minimum spacing)

RMC

RECEIVER MULTICOUPLER..
Beginning & End frequency
Check bandwidth constraints
Number of channels, must not exceed the number of RMC ports. Specify power source (12VDC, 24VDC, 120VAC, 220VAC)

COMBINING

COMBINER..
Exact Tx frequency of each channel
Check Tx/Tx spacing (per catalog specified minimum spacing)

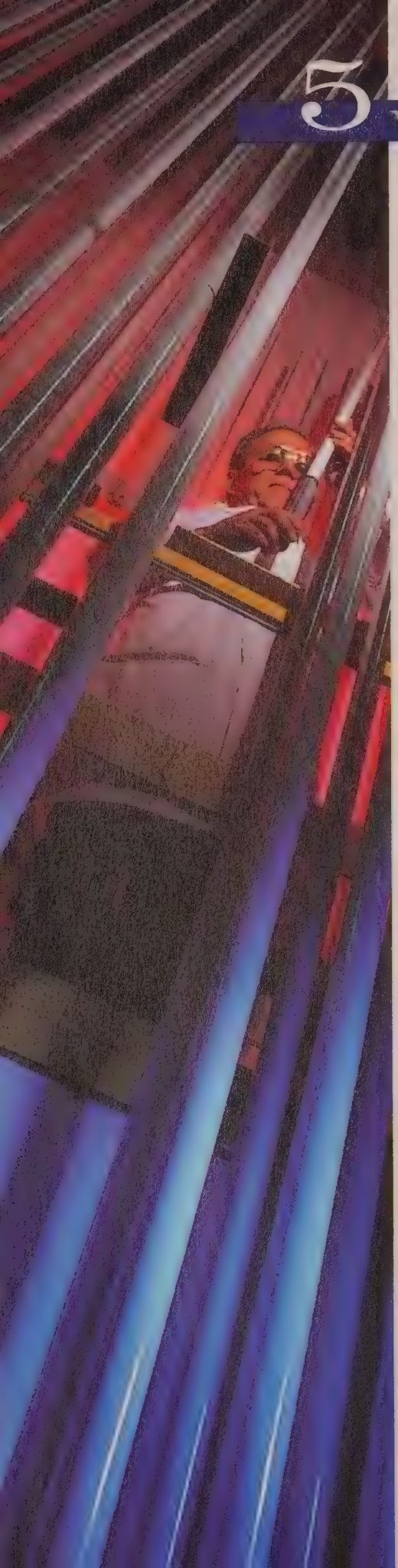
COMBINER EXPANSION HARNESS
New and Existing frequencies
Check combiner minimum spacing (per catalog)

BDA

BI-DIRECTIONAL AMPLIFIER
Specify Beginning & End frequencies for narrow band models (48561) Specify "-N" for wall mount unit

SYSTEMS

SYSTEMS...
Specify Transmit & Receive frequencies where applicable.



5 YEAR WARRANTY

Our 5 year warranty on all base station antennas.

When Celwave ships you a base station antenna, it is guaranteed to be free from defects in materials or workmanship for five years. In the unlikely event it is not, we will repair or replace it.* No charge. No complications.

If you have a problem with any one of them - from monopole to Penetrator® - you will quickly discover our warranty is the best in the business.

*See full warranty on price list.

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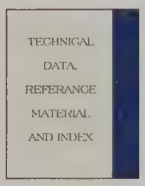

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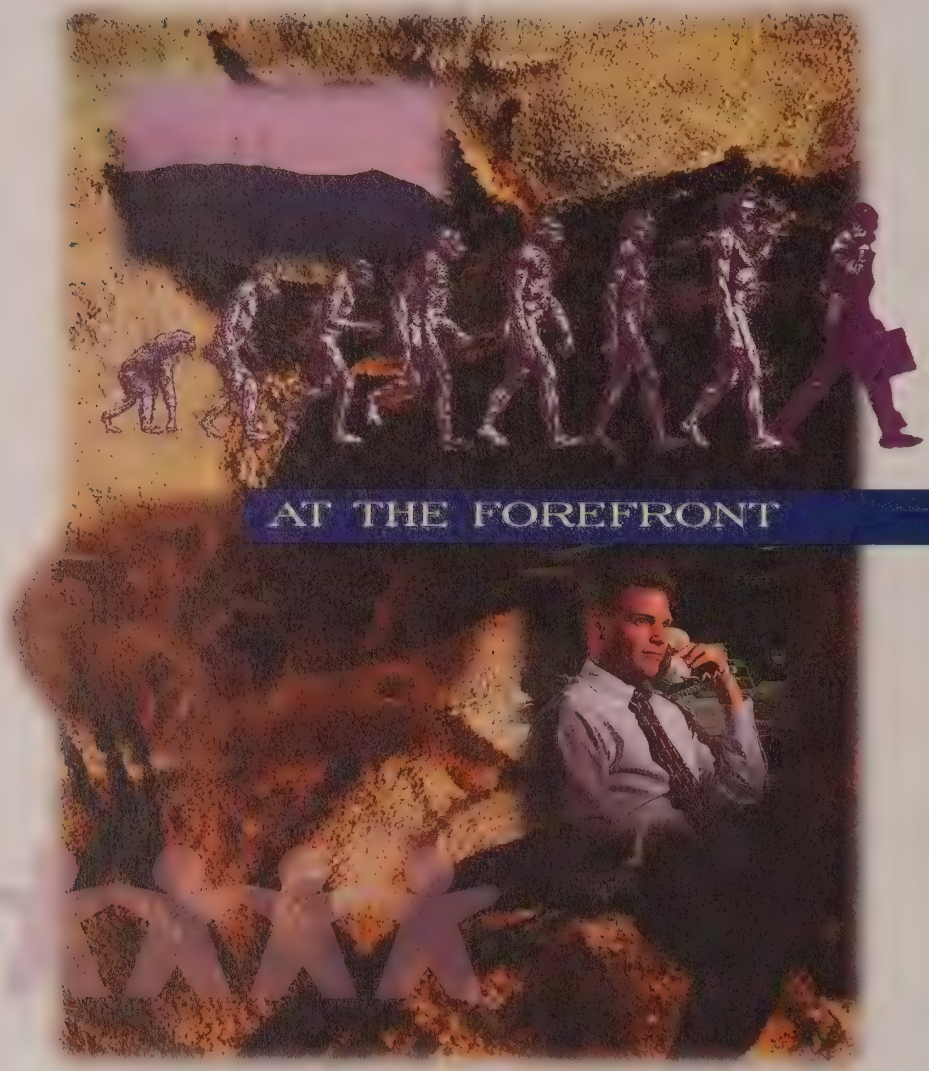


MAN COMMUNICATES

From incisions in clay to the invention of printing, from the inception of telegraphy to the wonders of the telephone, radio and television, humans over the centuries have captured and conveyed information with increasing speed and efficiency.

In the modern era one company has been consistently at the forefront of telecommunications improvements: Celwave.

Tracing its lineage to the earliest days of radio, Celwave today serves you with a dazzling array of communication system components that assure peak performance and user satisfaction.

You will find Celwave technology contributing superior performance to conventional two-way radio...to land mobile and marine communications...to cellular systems...to paging and personal communications systems.

At Celwave you will also find an ongoing dedication to leadership that permeates the entire company: engineering, manufacturing, research and development, customer service, sales and administration. Because you deserve it. Because we demand no less of ourselves.

Finally, you will encounter an environment that focuses on a factor all too often overlooked in communications.We listen.

When you express a need—from a simple product modification to a major product restructuring—we listen. Intently.

And we act to meet your need expeditiously. Cost-effectively.

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

ISO 9001 COMPLIANT

*NASHVILLE 9002 COMPLIANT

PERSONAL INVOLVEMENT

The manufacture of Celwave products demonstrates an unwavering commitment to your satisfaction. There are no cookie-cutter, out-the-door operations. Instead, at each of our plants there is a day-in, day-out quest by highly skilled workers for zero-flaw results.

Workers identify any imperfection, no matter how minor.

Quality control relentlessly discards any unit that is not 100% perfect.

And all Celwave personnel are encouraged to suggest product improvements.

As a result, Celwave has received ISO 9001 certification for our manufacturing facilities in Marlboro, New Jersey; Phoenix, Arizona; Corvallis, Oregon and ISO 9002 certification for our Customer Service Center in Nashville, Tennessee. This international quality standard encompasses all aspects of our business from design, through manufacture and beyond. Worldwide.

Where Celwave Excels.

- Base station antennas
- Duplexers
- Filters
- Cavity devices
- Transmitter combiners
- Receiver multicouplers
- Bi-directional amplifiers
- Advantage mobile antennas
- Distributed communication systems
- Transmission line

FEET ON THE GROUND, EYES ON THE FUTURE

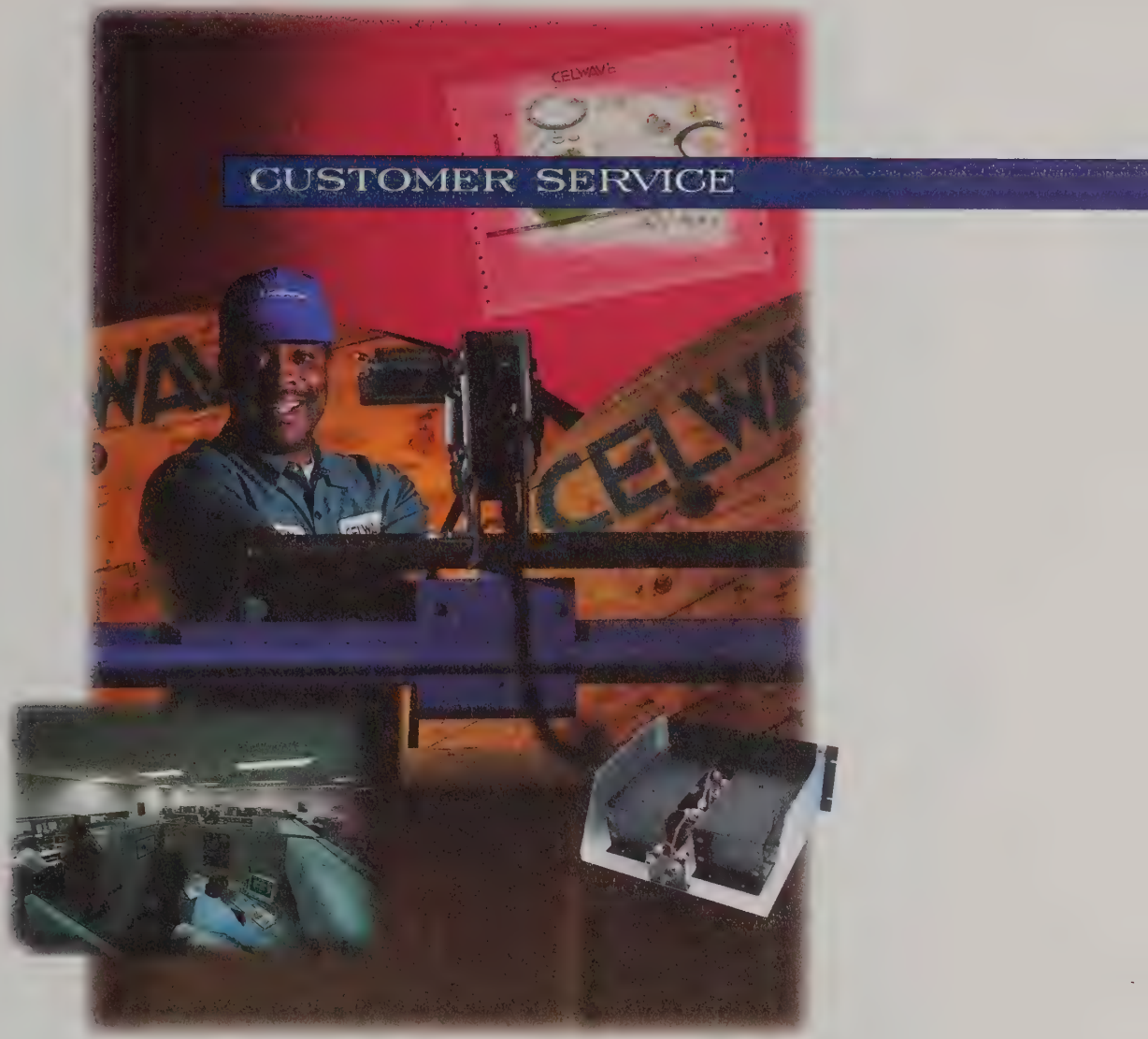
Few companies can boast the experience of Celwave's RF communications engineers and designers. Fewer still put this experience so readily at your disposal.

Functioning from all of our facilities, Celwave researchers apply their expertise to virtually every protocol, solving problems you confront and difficulties you define. No off-the-shelf solutions here. Instead, we study your application, then work out a customized solution for any—or every—element, including layout, site selection and expanded coverage.

But even while Celwave research keeps its feet firmly on the ground, its gaze is also fixed on a far horizon: the future of RF communications. And just as it has in the past, Celwave research will undoubtedly be the source of bigger breakthroughs and better products that benefit you...and an entire industry.

CELWAVE: PRO

1933	James Lawrence Bernard Jr., a student of Guglielmo Marconi, founds the Communication Product Company, a supplier of copper cable equipment, in New Jersey.
World War II	Manufacture of two-way ground plane antennas for naval vessels.
1956	Development of Stationmaster series of high gain base station antennas.
1962	Phelps Dodge purchases company, now designated Phelps Dodge Communications Company.
Late 60's	Participation with Bell Labs in early cellular technology development.



READY WHEN YOU ARE

Celwave customer service puts the emphasis on you, with personnel available to assist you by phone, fax, or at your site. At a moment's notice.

You'll find prompt, standard-setting customer service at our Nashville, Tennessee, sales and distribution center; at our Toronto, Canada, Sales/tech. service center, and at each of our office sites.

What's more, we welcome your calls to any of our other facilities, as well. When your specialists talk with ours, remarkable results can be achieved.

AST, BRIGHT FUTURE

1980 Acquisition of R.J. Communications Products Inc., prominent manufacturer of combiners and multicouplers; and of HMP Antennefabrik, Danish manufacturer of antenna system product.

1983 Company acquired by Celwave Systems, renamed Celwave, R.F.

1985 Acquisition of Antenna Incorporated, manufacturer of mobile antennas; development of "Glass Advantage" antenna.

1988 Acquisition of land mobile base station antenna line from Bogner Broadcast Equipment Corporation.

1991 Acquisition of Janel Labs, key supplier of receiver multicoupler system components.

THINKING GREEN.

Celwave is always looking for ways to protect the neighborhoods in which we work and the world in which we live.

We have stopped using chloro-flourocarbons to clean our products. We have switched to water born paint because it contains low VOC levels and reduced the amount of trash we put out by two thirds.

When we ship products, we ask customers to send the packaging back so we can recycle it.

And when a customer asked us to stop using styrofoam packing, we replaced it with corrugated cardboard and a completely biodegradable foam made from corn starch.

Some of the most innovative environmental ideas we get come from our customers and our employees. So we're open to suggestions. With enough of us thinking green, our environment can get more of the help it needs.

Antenna Products

Antenna Products

THE FOLLOWING INFORMATION IS REQUIRED WHEN PLACING AN ORDER:

BASESTATION, MOBILE, AND PORTABLE ANTENNAS....

Provide frequency or frequency band

Check catalog to comply with bandwidth constraints

PENETRATOR...

Provide downtilt when non-standard or when ordering OPTION-J, OPTION-L, or J-CABLES

TO PLACE AN ORDER:

IN NORTH AMERICA, MEXICO:

Tel: 1-800/321-4700 Fax: 1-615/641-1910

INTERNATIONAL:

Tel: 1-908/462-1880 Fax: 1-908/431-8388

TECHNICAL SUPPORT:

Tel: 800/659-1880 Fax: 1-908/462-6919

OR CALL...1-800/CELWAVE

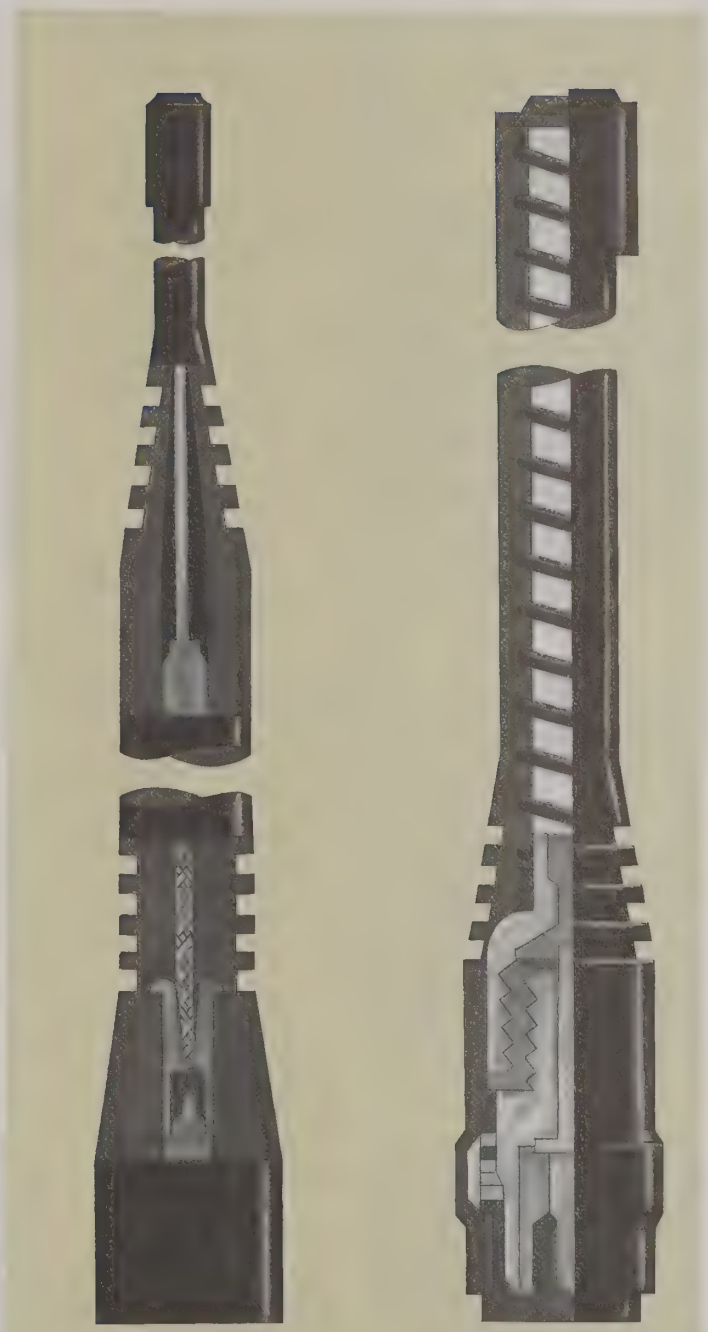
Eagle Series®
Molded Professional Portable Antennas

Better Bird.
Better Features.

All of which make the Eagle cost a little more while making the duck an endangered species.

- **Injection molded in durable, yet stylish polyurethane.**
- **Fully encapsulated element to prevent shorting and corrosion.**
- **Designed and tested for 5-year life cycle.**
- **Connector is skirt sealed against dirt, chemicals and other contaminants.**
- **Preplated copper element over high carbon steel for maximum radiation.**
- **Hand cut for required frequency to ±5 MHz for best VSWR.**
- **One piece molded construction covers antenna and connector boot for sleeker, more attractive look.**
- **Connector plated for maximum conductivity and corrosion protection. The BNC and TNC connectors have gold plated floating center pin.**

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.



Cut-away View

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

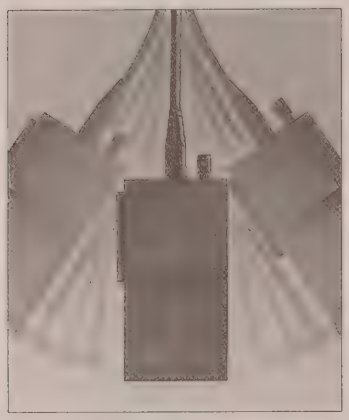
2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

118-960 MHz

Eagle Series®
Molded Professional Portable Antennas

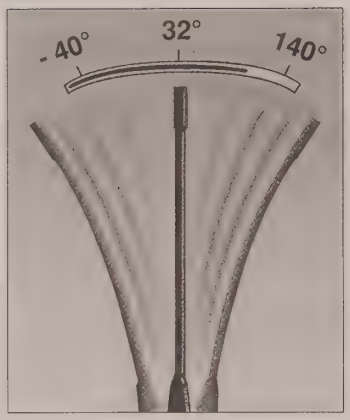
If there's a tougher breed of molded, portable radio antennas, it hasn't been born yet.

The Eagle soared through a whole series of tests run by people who didn't care whether it flew or flopped...



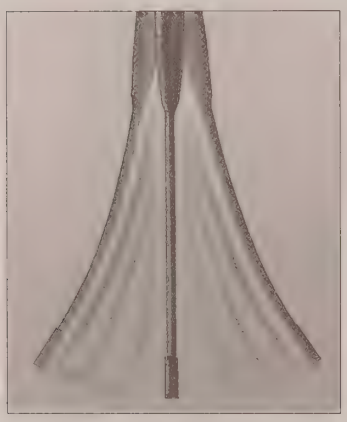
The 2,000,000 Hit Marathon

Held at its base, the Eagle was smacked two million times in its mid-section. One million 90° bends to the right. Another million 90° bends to the left. The beating never even ruffled its feathers.



The Low Temperature Bend.

First, a thousand hits during a temperature cycle of 32°F to 140°F. Then, after a three-hour cool down to lower its body temperature to -40°F, a quick 90° bend failed to break the Eagle's neck or crack its hide.



The Swinging Pendulum Test.

Hanging by its neck and attached to 2-1/2 pounds of weight, the Eagle was whipped from vertical to 45° horizontal a total of 130,000 times. Our bird never lost its grip.

The Four Foot Nose Dive.

Dropped not once, but five times, with a full size radio attached, the impact didn't so much as dent the Eagle's beak.

The 50 Pound Pull.

Anchored to an immovable object and held below its tip, the Eagle was subjected to a pull of fifty pounds. That's 45 pounds more than if it were used to yank a radio out of its case.

The Corrosive Salt Shower.

Not a once-over-lightly bird bath, but two hours soaking was duck soup for the Eagle. After the wetting down it still had all the right connections, and no corrosion.

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

Eagle Series®

Helical Style 118-174 MHz

Designed and rigorously tested with a 5-year design life, this molded professional portable antenna is factory tuned to the required frequency band for best VSWR. Projection molded in durable polyurethane, this one piece antenna features a fully encapsulated element and a plated, skirt sealed connector to prevent shorting and corrosion. VHF helical style models are available with BNC (M), 5/16" - 32 x 1/2" (M), 12-28 (F), and TNC (M) connectors. BNC and TNC connectors have gold plated floating center pin.

SPECIFICATIONS

Maximum Power - Watts	20
Impedance - Ohms	50 nominal*
Temperature Range - °F(°C)	Operating Temperature -22° to +140° (-30° to +60°)

*Varies with ground plane provided by individual portable.

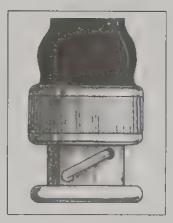
Ordering Information

If you require something other than the standard configurations listed, we will work with you to design an antenna to suit your special requirements. Contact our Customer Service Department for information.

VHF HELICAL FREQUENCY	CONNECTOR	ITEM NO.
118-127 MHz	BNC-male	B118B
	5/16" - 32 x 1/2" male	B118H
	12 - 28 female	B118M
	TNC male	B118T
127-136 MHz	BNC-male	B127B
	5/16" - 32 x 1/2" male	B127H
	12 - 28 female	B127M
	TNC-male	B127T
136-144 MHz	BNC-male	B136B
	5/16" - 32 x 1/2" male	B136H
	12 - 28 female	B136M
	TNC-male	B136T
144-148 MHz	BNC-male	B144B
	5/16" - 32 x 1/2" male	B144H
	12 - 28 female	B144M
	TNC-male	B144T
148-155 MHz	BNC-male	B148B
	5/16" - 32 x 1/2" male	B148H
	12 - 28 female	B148M
	TNC-male	B148T
155-164 MHz	BNC-male	B155B
	5/16" - 32 x 1/2" male	B155H
	12 - 28 female	B155M
	TNC-male	B155T
164-174 MHz	BNC-male	B164B
	5/16" - 32 x 1/2" male	B164H
	12 - 28 female	B164M
	TNC-male	B164T

VHF Helical

Connectors



BNC

5/16" - 32 x 1/2"

12-28

TNC

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

Eagle Series®

Helical Style 406-512 MHz
Quarter-wave Whip 406-512 MHz

These UHF one piece portable antennas are available in both helical and quarter-wave whip styles. Designed and rigorously tested with a 5-year design life, the antennas are factory tuned to the frequency band for best VSWR. Injection molded in durable polyurethane, they feature a fully encapsulated element and a plated, skirt sealed connector to prevent shorting and corrosion. Helical and quarter-wave antennas are available with BNC (M), 5/16" - 32 x 1/2" (M), 1/4" - 32 x 3/16" (M), and TNC (M) connectors. BNC and TNC connectors have gold plated floating center pin.

SPECIFICATIONS

Maximum Power - Watts	20
Impedance - Ohms	50 nominal*
Temperature Range - °F (°C)	Operating Temperature $^{-}22$ to $^{+}140$ ($^{-}30$ to $^{+}60$)

*Varies with ground plane provided by individual portable.

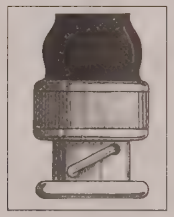
Ordering Information

If you require something other than the standard configurations listed, we will work with you to design an antenna to suit your special requirements. Contact our Customer Service Department for information.

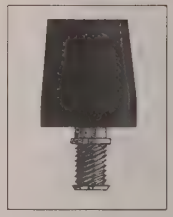
UHF Helical UHF Quarter-wave

FREQUENCY	CONNECTOR	UHF HELICAL ITEM NO.	UHF QUARTER-WAVE ITEM NO.
406-420 MHz	BNC-male	C406B	D406B
	5/16" – 32 x 1/2" male	C406H	D406H
	1/4" – 32 x 3/16" male	C406X	D406X
	TNC-male	C406T	D406T
420-450 MHz	BNC-male	C420B	D420B
	5/16" – 32 x 1/2" male	C420H	D420H
	1/4" – 32 x 3/16" male	C420X	D420X
	TNC-male	C420T	D420T
450-470 MHz	BNC-male	C450B	D450B
	5/16" – 32 x 1/2" male	C450H	D450H
	1/4" – 32 x 3/16" male	C450X	D450X
	TNC-male	C450T	D450T
470-512 MHz	BNC-male	C470B	D470B
	5/16" – 32 x 1/2" male	C470H	D470H
	1/4" – 32 x 3/16" male	C470X	D470X
	TNC-male	C470T	D470T

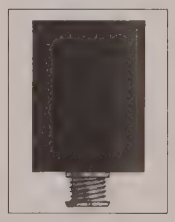
Connectors



BNC



5/16" - 32 x 1/2"



1/4" - 32 x 3/16"

TNC

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

Eagle Series®

Quarter-wave Whip 806-896 MHz
Half-wave Whip 806-896 MHz
Half-wave Dipole 806-960 MHz

These one piece portable antennas are available at 800 MHz for trunking and cellular applications. Designed and rigorously tested with a 5-year design life, they are factory tuned to the required frequency band for best VSWR. Injection molded in durable polyurethane, these antennas feature a fully encapsulated element and a plated, skirt sealed connector to prevent shorting and corrosion. Half-wave dipole, half-wave whip, and quarter-wave whip style are available with a variety of connector options for both trunking and cellular applications.

SPECIFICATIONS

Maximum Power - Watts	20
Impedence - Ohms	50 nominal*
Temperature Range - °F (°C)	Operating Temperature $^{-}22$ to $^{+}140$ ($^{-}30$ to $^{+}60$)

*Varies with ground plane provided by individual portable.

Ordering Information

If you require something other than the standard configuration listed, we will work with you to design an antenna to suit your special requirements. Contact our Customer Service Department for information.

HALF-WAVE DIPOLE FREQUENCY	CONNECTOR	MODEL NO.
806-866 Trunking	SMA-female	G806S
	BNC-male	G806B
821-896 Cellular	SMA-female	G821S
	BNC-male	G821B
	TNC-male	G821T
824-894 Cellular	Right Angle TNC-male	G821R-1
872-960 Cellular	Right Angle TNC-male	G821R-2
821-890 Cellular	Swivel TNC-male	G821L

HALF-WAVE WHIP FREQUENCY	CONNECTOR	MODEL NO.
806-866 Trunking	SMA-female	F806S
821-896 Cellular	SMA-female	F821S
	BNC-male	F821B
	TNC-male	F821T

QUARTER-WAVE WHIP FREQUENCY	CONNECTOR	MODEL NO.
806-866 Trunking	SMA-female	E806S
	TNC-male	E806T
821-896 Cellular	SMA-female	E821S
	TNC-male	E821T

Quarter-wave Whip | Half-wave Whip | 800 MHz Dipole | Half-wave Dipole

Connectors

SMA | BNC | TNC | RIGHT ANGLE

Transit Antennas

PD1061 Heavy Duty VHF 148-174 MHz
PD1073 Heavy Duty UHF 406-512 MHz
A44008 Heavy Duty 800 806-890 MHz

Constructed to withstand exposure to environmental extremes, these heavy duty transit antennas are the choice for vehicles engaged in public safety, construction or transportation. The PD1061 and 1073 models are folded quarter wavelength sections of 6061-T6 aluminum tube enclosed by a high impact plastic radome. The patented A44008 model features a printed circuit board for maximum stability.

- **ABS radome** — Protects against hostile environments.
- **Stainless steel hardware** — Protects against corrosion.
- **Printed Circuit** — Maximizes stability.

Ordering Information

Item Number	Frequency Range - MHz	Connector
PD1061	148-174*	UHF female
PD1073	406-512*	Right Angle BNC female
A44008	806-890	BNC female

***Specify exact frequency.**

A44008
U.S. PATENT #4,395,713

ELECTRICAL SPECIFICATIONS	PD1061	PD1073	A44008
Frequency Range - MHz	148-174	406-512	806-890
Gain	Unity	Unity	Unity
Maximum Power - Watts	100	100	100
VSWR	2:1	2:1 Max.	Less than 2:1
Nominal Impedance - Ohms	50	50	50
Radiation Pattern	Omni-directional (Roof Mounted)	Omni-directional (Roof Mounted)	Omni-directional (Roof Mounted)
Polarization	Vertical	Vertical	Vertical
Bandwidth	3 MHz	16 MHz	Over 90 MHz Under 2:1

MECHANICAL SPECIFICATIONS	PD1061	PD1073	A44008
Radiator Material	High Impact Plastic	High Impact Plastic	High Impact ABS
Connector	UHF female	Right Angle BNC female	BNC female, No Cable
Height - in. (mm)	4 (101.6)	3-1/2 (88.9)	3 (76.2)
Length - in. (mm)	21 (533.4)	10-1/2 (266.7)	7-3/4 (196.8)
Width - in. (mm)	3 (76.2)	2-3/4 (69.8)	3-3/8 (85.7)

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5 dB Gain Antenna

A43434N Phased Collinear Style

This sturdily constructed 100 Watt antenna is noted for excellent performance. The combination of heavy duty stainless steel shock spring and whip resists bending at high speeds, and sliding sleeve design imparts maximum mechanical strength. Tuning requires no whip cutting. Unit includes spring, whip with slideable phasing section assembled, 17' (5.2 m) RG-58/U coaxial cable and PL-259 connector.

- **Stainless steel shock spring, whip** — Resists bending and corrosion.
- **Sliding sleeve** — Optimum mechanical strength.
- **Easy tuning** — Requires no whip cutting.

ELECTRICAL SPECIFICATIONS	A43434N
Frequency Range - MHz	450-470
Gain - dB	5
Maximum Power - Watts	100
VSWR	Less than 1.5:1
Radiation Pattern	Omni-directional
Polarization	Vertical
Bandwidth	Over 11 MHz @ 1.5:1

MECHANICAL SPECIFICATIONS	A43434N
Radiator Material	17-7PH Stainless Steel
Spring Material	Stainless Steel
Cable	17' (5.2 m) RG-58/U
Connector	PL-259
Whip Length - in. (mm)	34 (863.6) Maximum

Ordering Information

Item Number	Frequency Range - MHz	Mount
A43434N	450-470	3/4" (19 mm) Hole, Motorola Style

A43434N

Motorola Style 3/4" Hole Mount Model 41918

Exact replacement Motorola 3/4" hole mount with 14' (4.2 m) RG-58A/U cable and PL-259 connector.

41918

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Glass Advantage®

PD821

Unlike conventional mobile cellular antennas, our Glass Advantage® uses advanced technology to couple through the glass of a vehicle and eliminates the need for a hole to be drilled in the vehicle's surface.

The Glass Advantage® transmits the signal through the windshield or back window and does not require the typical "ground plane" of its mobile cellular predecessors.

This premium performance, Euro-black finished antenna does not require the use of messy silicones or adhesives. Its advanced mounting technique allows installation in less than 10 minutes. Each antenna includes whip and base assembly, coupler box, cable assembly, window cleaner packet and four cable clips: mini UHF, or TNC male connector.

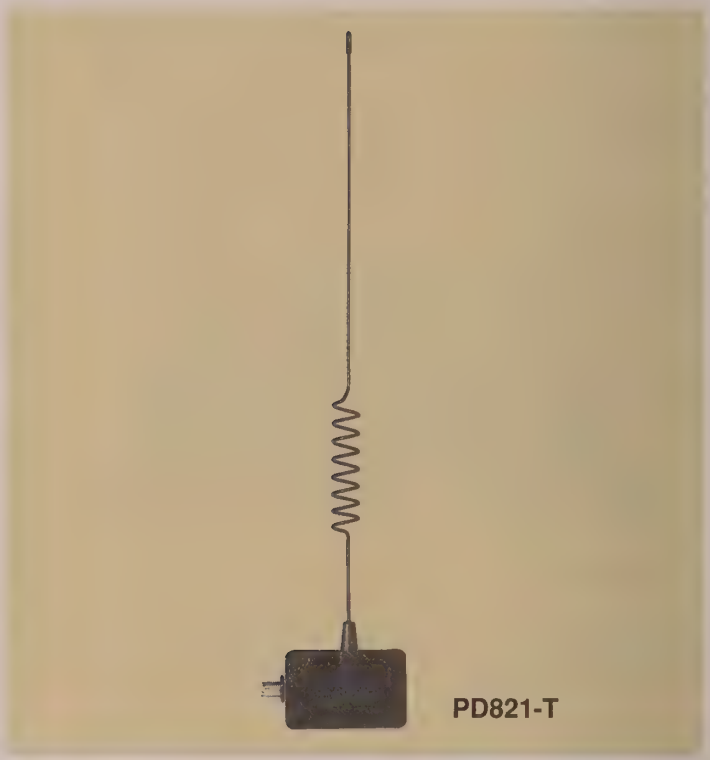
- **Premium performance** — Less hand-offs, fewer dropped calls, clearer reception and transmission.
- **Waterproof** — Base won't trap water.
- **No messy glues** — Coupler base attaches instantly and permanently.
- **No holes bored** — Eliminates damage to car body surfaces.

ELECTRICAL SPECIFICATIONS	PD821
Frequency Range - MHz	824-894
Maximum Power - *Watts	50
Gain - dB	3
Nominal Impedance - Ohms	50
Radiation Pattern	Omni-Directional
Polarization	Vertical
Maximum VSWR	Less than 2:1

MECHANICAL SPECIFICATIONS	PD821
Radiator Material	Premium Stainless Steel
Cable - ft. (m)	15.5 (4.72) RG-58/U
Whip Length - in. (mm)	12.5 (318)
Shipping Mode	UPS

***Safety note:** This product was designed for use with radios of 15 Watts or less transmitter power. Exceeding this limit may potentially cause hazardous levels of in-vechicle radiation.

U.S. PATENTS #4,882,592
#4,839,660



Ordering Information

Item Number	Frequency Range	Connector
PD806T	806-869 MHZ	TNC
PD806M	806-869 MHZ	Mini UHF
PD821-T	824-894 MHz	TNC
PD821-M	824-894 MHz	Mini UHF
PD900-M	870-960 MHz	Mini UHF
PD900-T	870-960 MHz	TNC

Replacement Parts Available:

DESCRIPTION	806-896 MHz ITEM NO.	824-894 MHz ITEM NO.	870-960 MHz ITEM NO.
Re-installation Kit: Includes — Cable Clips (4), Adhesive Tape, Window Cleaner, Instruction Sheet.	42403	42403	42403
Cable Assembly	42020	42020	42020
Base Assembly Only	42055	42055	42055
Whip Assembly Only	102119	42022	43095
Base and Whip Assembly	102120	42201	43096
Coupler Box	102126	42008	428850
TNC Male Connector	14A0067	14A0067	14A0067
Mini UHF Connector	14A0014002	14A0014002	14A0014002
N-Male Connector	032119900	032119900	032119900
Teflon PL-259 Connector	19A0130002	19A0130002	19A0130002

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Monopole Antennas

PD128* **Unity Gain Omnidirectional**
PD206* **3.0 dBd Cardioid**
PD207* **3.0 dBd VHF Cardioid**

***Exact frequencies must be specified.**

These antennas feature a grounded radiator to provide optimum protection from proximity lightning strikes and reduce static noise. Their durable design makes them ideal for most high and low band applications.

Monopole antennas are supplied complete with mounting hardware and may be factory tuned to your exact frequency requirements or provided as field tunable (FT models).

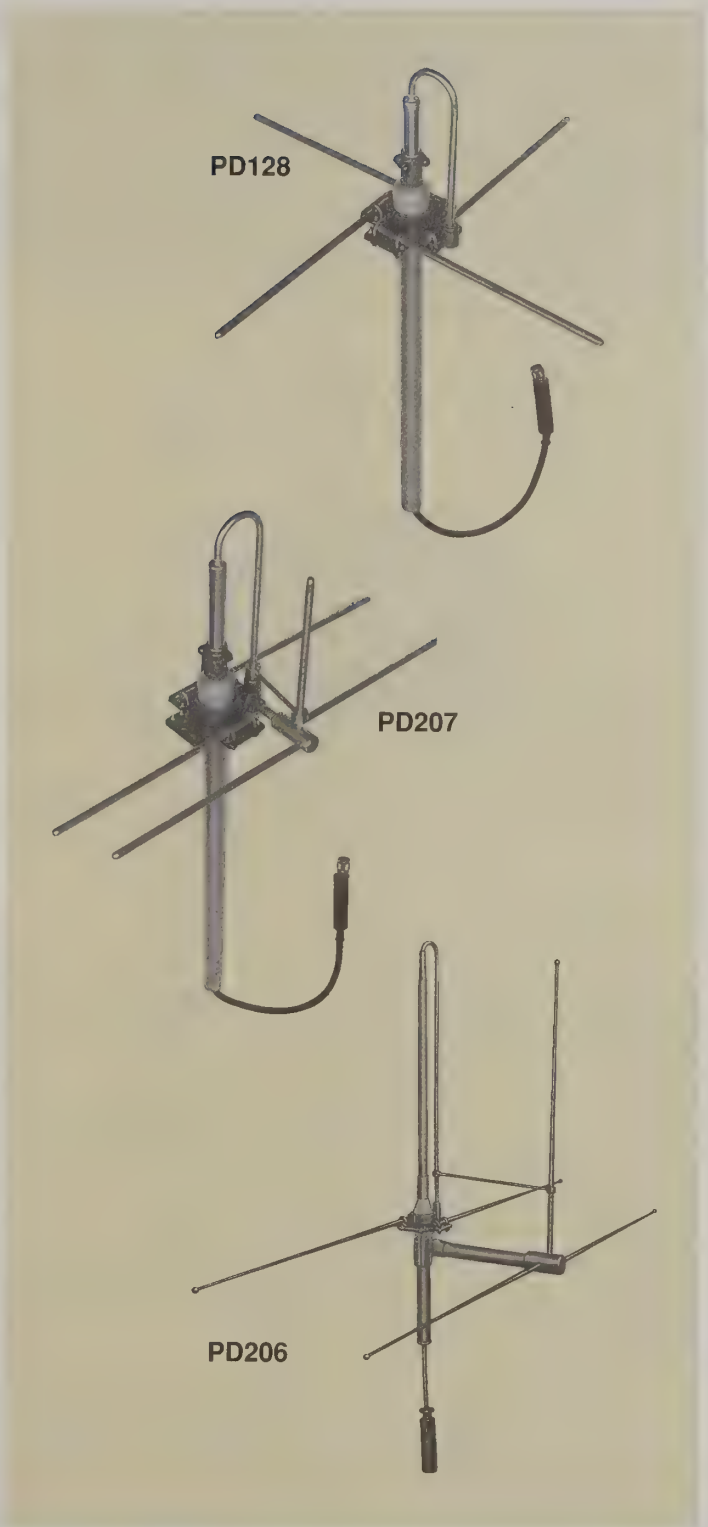
The omnidirectional PD128 has a folded radiating element and is intended for service in installations requiring a directly grounded structure. The element extends above the ground plane 9 ft. (2.74 m) at 30 MHz and 3.7 ft. (1.1 m) at 150 MHz.

The PD128-2FT may be precision field tuned using a hand saw and a tape ruler within its 30-54 MHz frequency range. Easy to follow instructions and cutting charts are supplied. It is an excellent emergency antenna. When stored on site it can be immediately tuned and installed, eliminating costly downtime.

PD206 Cardioid Antenna, with the addition of a driven director, produces 3.0 dBd forward gain and 20.0 dBd front-to-back ratio. Both director and radials are made of high strength aluminum. This antenna will show a DC open circuit between the inner conductor of the flexible extension and the radiating element.

PD207 Cardioid Antenna is a high band version of PD206. Both antennas make use of a driven director to obtain their gain and directivity. Thus they are capable of more consistent performance than if they were based on parasitic principles alone.

- **6061-T6 Aluminum construction** — For high strength, lower weight and corrosion resistance.
- **Direct ground** — Provides system protection against lightning strikes.
- **Tunable option (P128-2FT)** — Allows precise tuning in the field.



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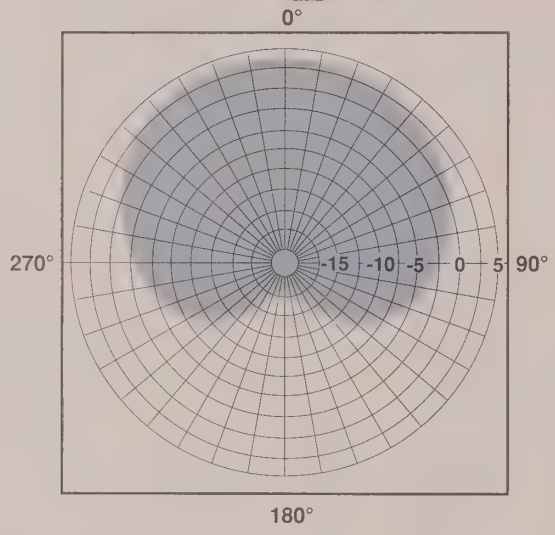
Monopole Antennas

Ordering Information*

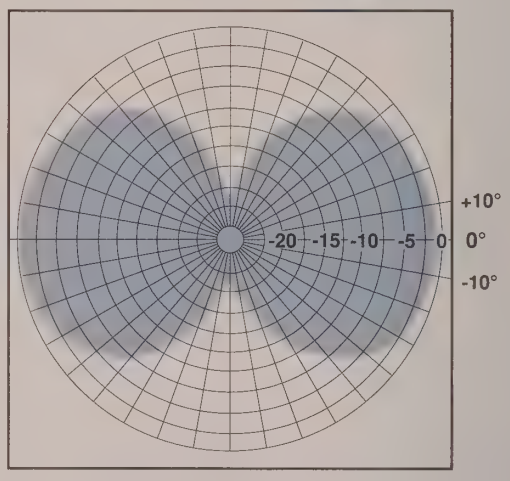
Item Number Standard	Item Number Field Tunable	Frequency Range-MHz	Item Number Standard	Frequency Range-MHz
PD128-1	PD128-1FT	25-29	PD206-1	25-30
PD128-2	PD128-2FT	30-39.5	PD206-2	31-40
PD128-2A	PD128-2AFT	39.75-54	PD206-2A	41-54
PD128-3	PD128-3FT	66-88	PD206-3	66-88
PD128-4	PD128-4FT	108-176	PD207	150-174
PD128-5	PD128-5FT	406-512		

***Exact frequencies must be specified.**

HORIZONTAL PATTERN
(Cardioid) PD206 and PD207



VERTICAL PATTERN PD128



ELECTRICAL SPECIFICATIONS	PD128	PD206	PD207
Frequency Range - MHz	25-512	25-88	150-174
Gain - dBd	Unity	3	3
Bandwidth - MHz for 1.5:1 VSWR	0.6 @ 30 MHz 3.0 @ 150 MHz 8.0 @ 500 MHz	0.4 @ 30 MHz 1.0 @ 66 MHz	3.0 @ 150 MHz
Vertical Beamwidth 1/2 Power Point	76°	76°	76°
Maximum Power Input - Watts	500	500	500
Front-to-Back Ratio - dBd	N/A	20	20
Lightning Protection	Direct Ground	Direct Ground	Direct Ground
Termination - Direct Flexible	18 in. (457 mm) RG8A/U Flexible Cable with N-male Connector Attached		

Note: All VSWR data referenced to 50 Ohms.

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Monopole Antennas

MECHANICAL SPECIFICATIONS	PD128	PD206	PD207
Overall Length - ft. (m)	9.75 (2.92) @ 30 MHz 3.71 (1.13) @ 150 MHz 2.67 (.813) @ 450 MHz	9.75 (2.92) @ 30 MHz 5.58 (1.70) @ 66 MHz	3.71 (1.13) @ 150 MHz
Support Pipe Diameter - in. (mm)	1-5/16 (33)	1-5/16 (33)	1-5/16 (33)
Mounting Length - in. (mm)	24 (610)	20 (508)	24 (610)
Weight - lbs. (kg)	13 (5.9) @ 30 MHz 7 (3.2) @ 150 MHz 5 (2.3) @ 450 MHz	20 (9.1) @ 30 MHz	10 (4.5) @ 150 MHz
Radiating Element Material	6061-T6 Alum. Rod and Pipe	6061-T6 Alum. Rod and Pipe	6061-T6 Alum. Rod and Pipe
Ground Plane Material	6061-T6 Aluminum Rod	6061-T6 Aluminum Rod	6061-T6 Aluminum Rod
Director Material	6061-T6 Aluminum Rod	6061-T6 Aluminum Rod	6061-T6 Aluminum Rod
Support Pipe Material	6061-T6 Aluminum Pipe	6061-T6 Aluminum Pipe	6061-T6 Aluminum Pipe
Rated Wind Velocity - mph (km/hr)	100 (161) @ 30 MHz 125 (201) @ 150 MHz 150 (242) @ 450 MHz	100 (161) @ 30 MHz	125 (201)@ 150 MHz
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	1.0 (.93) @ 30 MHz 0.16 (.015) @ 150 MHz 0.06 (.006) @ 450 MHz	1.5 (.139) @ 30 MHz	0.19 (.018) @ 150 MHz
Lateral Thrust @ 100 mph - lbs. (kg)	40 (18.2) @ 30 MHz 6.4 (2.9) @ 150 MHz 1.3 (0.2) @ 450 MHz	60 (27.3) @ 30 MHz 25 (11.4) @ 66 MHz	7.6 (3.5) @ 150 MHz
Bending Moment 1 in. (25mm) Below Ground Plane @ Rated Wind - ft./lbs. (m/kg)	90 (12.4) @ 30 MHz 6.4 (0.9) @ 150 MHz 1.3 (0.2) @ 450 MHz	100 (13.8) @ 30 MHz 30 (4.1) @ 66 MHz	7.7 (1.1) @ 150 MHz
Mounting Hardware - Supplied	PD46 Clamp Set (All Models)	PD46 Clamp Set (All Models)	PD46 Clamp Set (All Models)
Mounting Hardware - Optional	PD246 Pole Mount, PD502 Side Mount (Short), PD504 Side Mount (Long)		
Shipping Weight - lbs. (kg)	36 (16) @ 30 MHz	38 (17) @ 30 MHz	14 (6.4) @ 150 MHz
Shipping Volume - ft.^{3} (m^3)	3.25 (.09) @ 30 MHz	3.3 (.09) @ 30 MHz	1.1 (.03) @ 150 MHz
Shipping Mode	30-45 MHz - Common Carrier, 45-450 MHz - UPS		UPS

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

Side Mount Antennas

PD320* **2.5 dBd Offset-Gain**
PD322* **2.5 Omni (5.0 dBd Offset)**
PD324* **5.0 dBd Omni (7.5 Offset)**

***Exact frequencies must be specified.**

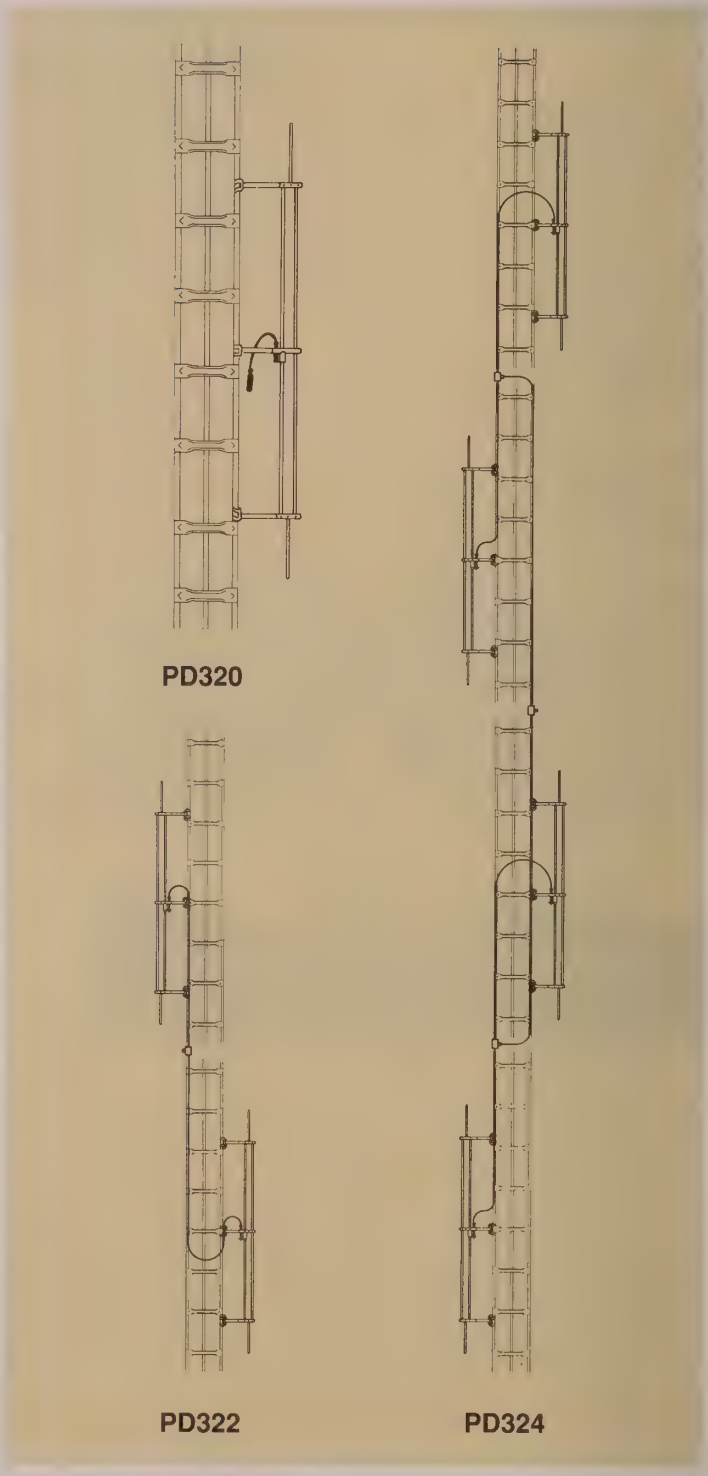
This is a series of side mounted antennas designed for applications requiring the utilization of available space on the sides of towers. Each antenna is supplied cut to the desired operating frequency and assembled ready for installation.

The single element side mounted PD320 provides an offset pattern with approximately 2.5 dBd gain in the forward direction. High strength aluminum alloy is used for all antenna parts, except the stainless steel mounting clamps.

The PD322, a 2.5 dBd Omni/5.0 dBd Offset Gain Antenna consists of two PD320 antenna elements and a matching harness. When mounted with its two elements on opposite sides of a small tower and spaced 3/4 wavelengths apart vertically, it produces an essentially circular pattern with approximately 2.5 dBd gain. The PD322 may also be mounted with both elements on one side of the tower in which case it will provide an offset pattern with approximately 5.0 dBd gain in the maximum direction.

The PD324, a 5.0 dBd Omni/7.5 Offset Gain Antenna consists of four PD320 antenna elements and a matching harness. This antenna, when mounted with its elements staggered around the tower and spaced 3/4 wavelengths apart vertically, has essentially a circular pattern with approximately 5.0 dBd gain. The antenna may also mounted with all elements on one side of the tower, in which case it will produce an offset pattern with approximately 7.5 dBd gain in the maximum direction.
Note: 1-1/2" is the maximum tower leg size to which antenna can be mounted without affecting performance.

- **Field adjustable** — Optimizes VSWR on different tower structures.
- **Side mount design** — Makes low band operation possible when top mounting is not desirable.



PD320

PD322

PD324

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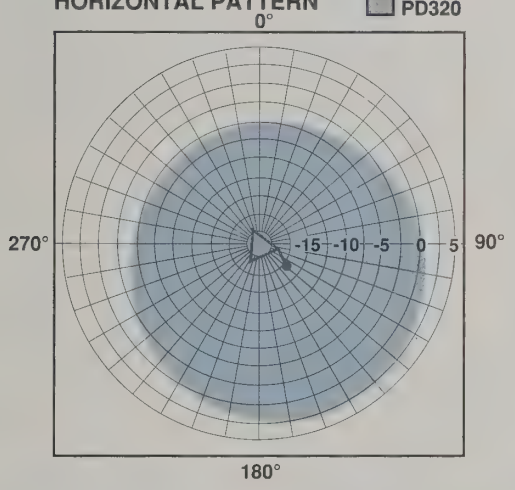
Side Mount Antennas

ELECTRICAL SPECIFICATIONS	PD320	PD322	PD324
Frequency Range - MHz	30-54 66-88	30-54 66-88	30-54 66-88
Gain - dBd	2.5 (Offset)	2.5 (Omni), 5.0 (Offset)	5.0 (Omni), 7.5 (Offset)
Bandwidth - MHz for 1.5:1 VSWR @ 30 MHz @ 76 MHz	 0.6 1.0	 0.6 1.0	 0.6 1.0
Vertical Beamwidth 1/2 Power Points	Installation Dependent	Installation Dependent	Installation Dependent
Maximum Power Input - Watts	500	500	500
Lightning Protection	Direct Ground	Direct Ground	Direct Ground
Termination - Direct Fixed	UHF-female	UHF-male	UHF-female
Flexible Extension - Supplied w/PD320	24 in. (610 mm) RG8A/U Flexible Cable with N-male Connector Attached		

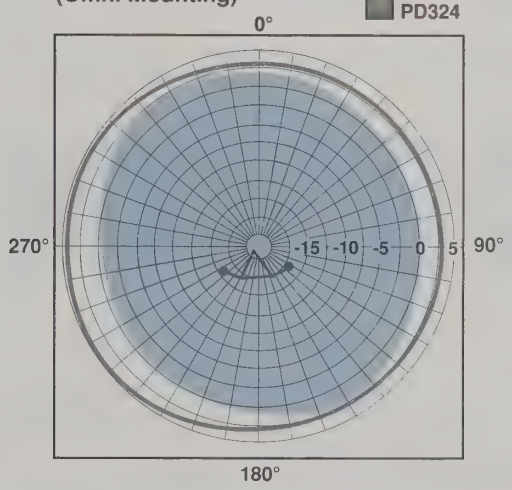
Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD320	PD322	PD324
Overall Length - ft. (m) @ 30 MHz @ 50 MHz @ 74 MHz	16.5 (5.03) 10 (3.05) 6 (1.83)	41 (12.5) 24 (7.32) 16 (4.88)	92 (28) 55 (16.8) 36 (11)
Spacing from Tower - in. (mm)	8 (203)	8 (203)	8 (203)
Weight - lbs. (kg)	15 (6.8)	32 (14.5)	66 (30)
Radiating Element Material	6061-T6 Aluminum	6061-T6 Aluminum	6061-T6 Aluminum
Wind Loading Area Flat Plate Equivalent - ft.^{2} (cm^2)	1.13 (.105)	2.25 (.209)	4.50 (.418)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	45 (20.5) @ 30 MHz	90 (40.9) @ 30 MHz	180 (81.8) @ 30 MHz
Mounting Hardware - Supplied	Stainless Steel Mounting Clamps mounts antenna on round tower legs 1 in. (25 mm) to 1.5 (38 mm) in. diameter		
Shipping Weight - lbs. (kg)	22 (10) @ 30 MHz	44 (20) @ 30 MHz	88 (40) @ 30 MHz
Shipping Volume - ft.^{3} (cm^3)	2.8 (0.08) @ 30MHz	5.5 (0.16) @ 30 MHz	11.1 (0.31) @ 30 MHz
Shipping Mode	30-54 MHz - Common Carrier; 55-88 MHz - UPS		

HORIZONTAL PATTERN PD320



HORIZONTAL PATTERN (Omni Mounting) PD322 PD324



Ordering Information

Item No.	Freq. Range - MHz	Item No.	Freq. Range - MHz	Item No.	Freq. Range - MHz
PD320-1	30-39	PD322-1	30-39	PD324-1	30-39
PD320-2	40-54	PD322-2	40-54	PD324-2	40-54
PD320-3	66-88	PD322-3	66-88	PD324-3	66-88

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Unity Gain Coaxial Antennas

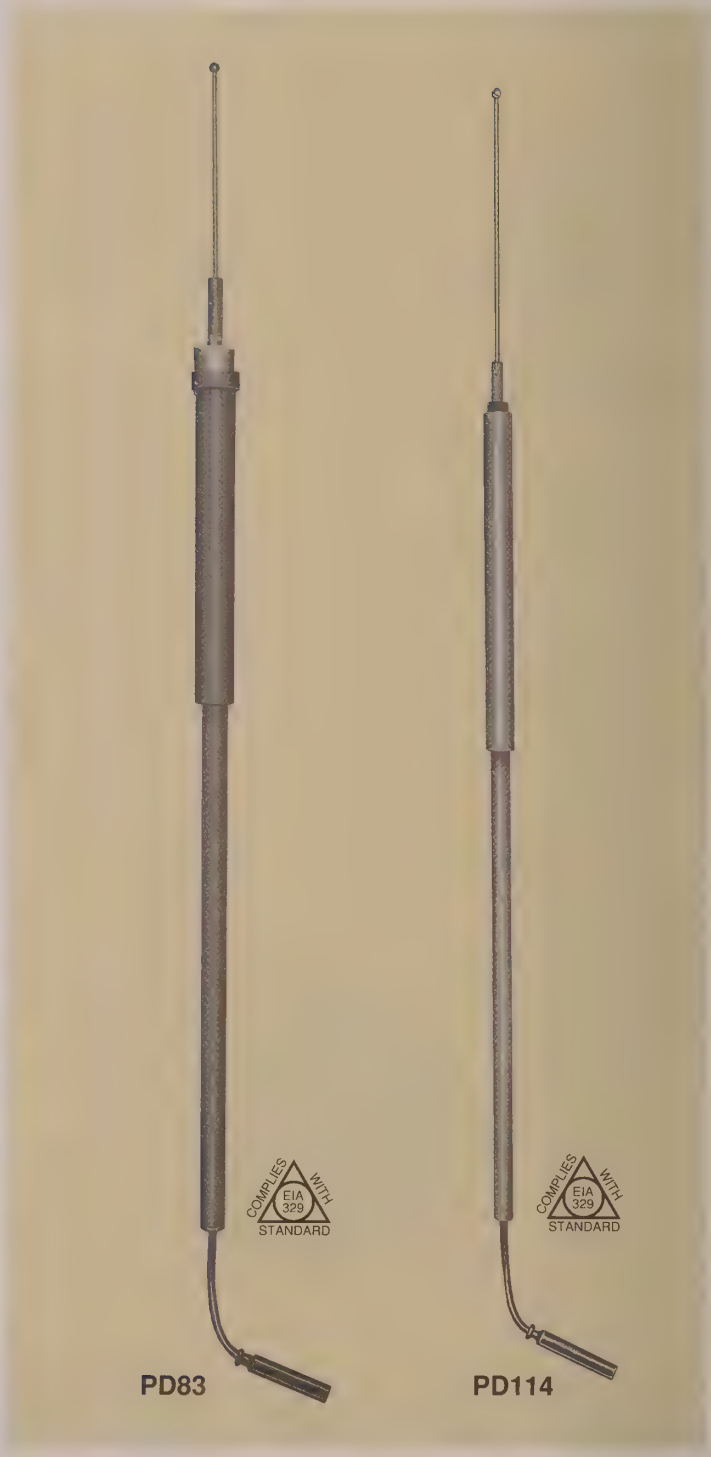
PD83 **General Service**
PD114 **Lightweight**

The PD83 is intended for use in fixed base station applications and is constructed of corrosion resistant materials to give long, trouble free service. The antenna is supplied standard with a 6061-T6 aluminum whip. A spring tempered 17-7PH stainless steel whip is available. *Specify PD83A.*

The PD114 is constructed principally of high strength corrosion resistant, 6061-T6 aluminum alloy. This antenna is ideally suited for use in portable field test work as well as in permanent base station operation. The overall length is similar to PD83. This antenna can be supplied with a 17-7 PH spring tempered stainless steel whip. *Specify PD114A.*

- **Coax design** — Provides broad vertical beam and good close in coverage.
- **Two piece construction** — Whip field replaceable.
- **6061-T6 Aluminum elements** — Welded solid rods for high strength, low weight and corrosion resistance.
- **Stainless steel whip option** — For the more hostile atmospheric environments.

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.



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Unity Gain Coaxial Antennas

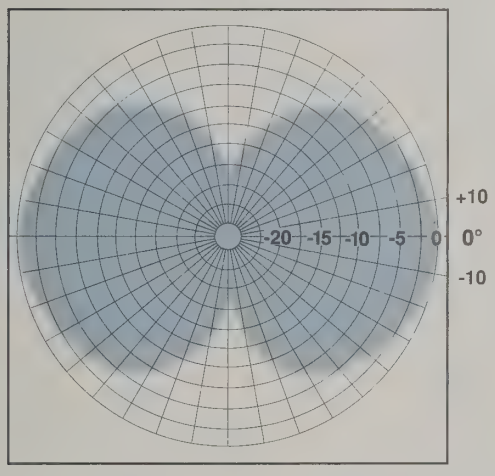
Ordering Information*

Item Number		Frequency Range - MHz
Standard	**SS Whip**	
PD83-1	PD83A-1	25-29.75
PD83-2	PD83A-2	30-39.75
PD83-3	PD83A-3	40-50
PD83-4	PD83A-4	70-76
PD83-5	PD83A-5	144-175
PD114-1	PD114A-1	25-30
PD114-2	PD114A-2	30-36
PD114-3	PD114A-3	36.25-42
PD114-4	PD114A-4	42.25-48
PD114-5	PD114A-5	48.25-50
PD114-6	PD114A-6	144-174
PD114-7	PD114A-7	66-88

***Specify exact frequency for bands not given.**

VERTICAL PATTERN

PD83 and PD114



ELECTRICAL SPECIFICATIONS	PD83	PD114
Frequency Range - MHz	25-175	25-174
Gain - dBd	Unity	Unity
Bandwidth - MHz for 1.5:1 VSWR	0.5 @ 25 MHz	1.0 @ 30 MHz
Vertical Beamwidth 1/2 Power Points	75°	75°
Maximum Power Input - Watts	500	500
Lightning Protection	Star Gap	Star Gap
Termination - Direct Flexible	18 in. (457 mm) RG8A/U Flexible Cable with N-male Connector Attached	

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD83	PD114
Overall Length - ft. (m)		
@ 30 MHz	18.5 (5.64)	18.5 (5.64)
@ 150 MHz	5.8 (1.77)	5.8 (1.77)
Skirt Diameter - in. (mm)	2 (51)	1.5 (38)
Support Pipe Diameter - in. (mm)	1-5/16 (33)	1-1/16 (27)
Support Pipe Mounting Length - in. (mm)	24 (610)	24 (610)
Weight - lbs. (kg)		
@ 30 MHz	17 (7.7)	8 (3.6)
@ 150 MHz	12 (5.4)	3 (1.4)
Whip Material	6061-T6 Aluminum	
Skirt Material	Copper	6061-T6 Alum.
Support Pipe Material	6061-T6 Aluminum	
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)		
@ 30 MHz	1.0 (.093)	1.11 (.103)
@ 150 MHz	.525 (.049)	.33 (.031)
Rated Wind Velocity - mph (km/hr)		
@ 30 MHz	100 (161)	75 (121)
@ 150 MHz	125 (201)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)		
@ 30 MHz	40 (18.2)	25 (11.4) @ 75 mph
@ 150 MHz	21 (9.5)	13 (5.9)
Bending Moment 6 in. (152 mm) Below Skirt @ 100 mph - ft../lbs. (m/kg)		
@ 30 MHz	225 (31.2)	148 (20.5) @ 75 mph
@ 150 MHz	15 (2.08)	14 (1.94)
Mounting Hardware - Supplied	PD46 Clamp Set	
Mounting Hardware - Optional	PD241 Wall Mount PD246 Pole Mount PD502 Side Mount (Short) PD504 Side Mount (Long)	
Shipping Weight - lbs. (kg)**	18-32 (8.2-15)	10-27 (4.5-12)
Shipping Volume - ft.^{3} (m^3)	0.7-1.8 (.02-.05)	0.7-1.8 (.02-.05)
Shipping Mode**	25-149 MHz - Common Carrier 150-174 MHz - UPS	

**Depending on frequency.

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Fiberglass Omnidirectional Antennas

PD1142* **Narrow Frequency Band**
BA3010* **Broad Frequency Band**
***Exact frequencies must be specified.**

The PD1142 is a narrow band unity gain antenna built to a specific spot frequency requirement to effectively reduce interference from other near frequency transmitters. Of rugged, two-piece construction, the antenna's lower section is enclosed in heavy-wall fiberglass tubing. The upper whip is fiberglass and attaches in the field with a protected 1/2" x 20 threaded connector. This unit provides the advantages of DC ground lightning protection, versatility, installation ease and requires no ground plane elements to decouple from the support structure.

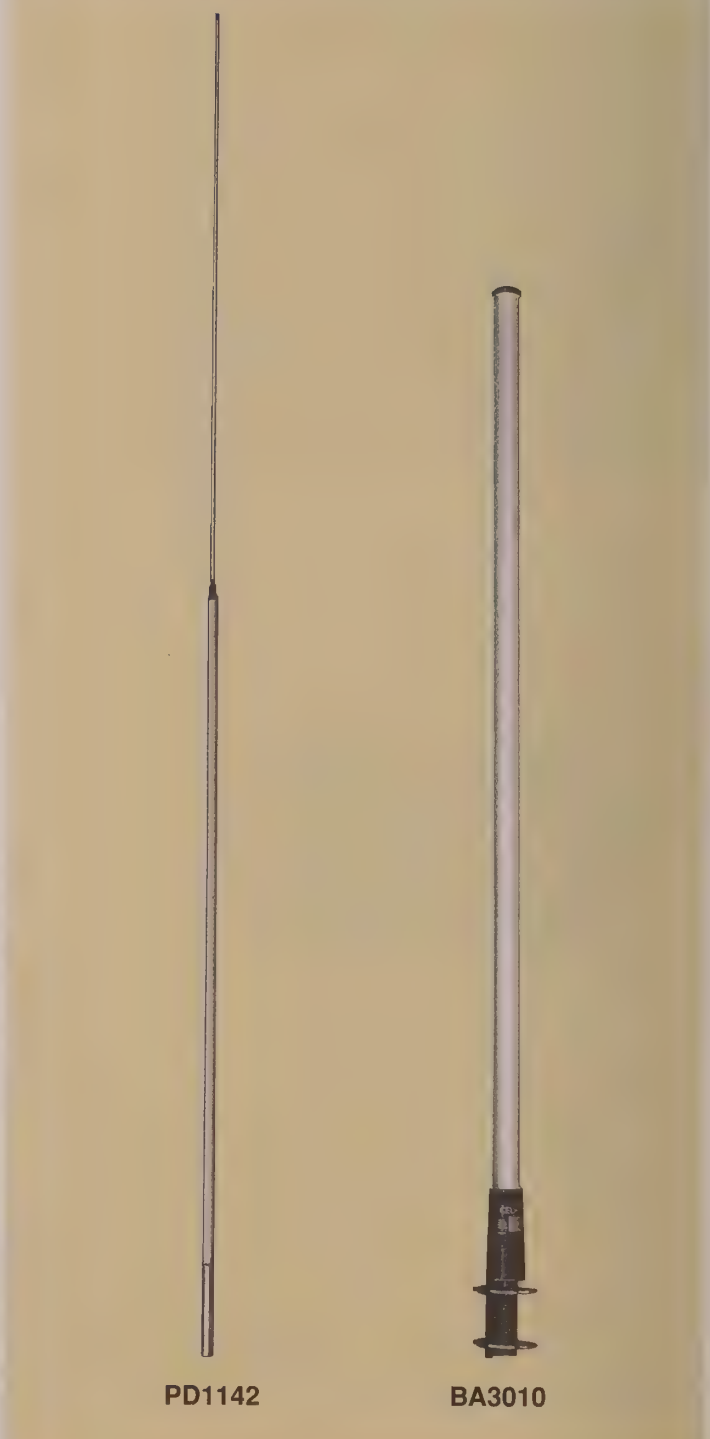
The BA3010 unity gain antenna features 7 MHz bandwidth to facilitate duplexing, or combining of several transmitters into one antenna. The coaxial type construction makes it ideal for both base station and marine applications. It may be mounted directly on top of or adjacent to a support pipe top section. Support pipes can range from 1 1/2 inches to 2 1/8 inches (top mount) and 3/4 inch to 2 1/8 inches (adjacent mounting). Top mounting allows the feed cable to lie enclosed when positioned inside the supporting structure. Adjacent mounting is accomplished using a grooved shoulder on the antenna support fixture.

- **Rugged construction** — Assures system reliability.
- **High selectivity (PD1142)** — Limits interference from nearby systems.
- **Wide bandwidth (BA3010)** — Facilitates duplexing or combining.

Ordering Information

Item Number	Frequency Range - MHz
PD1142-1	25-30*
PD1142-2A	30-35*
PD1142-2B	35-42*
PD1142-2C	42-54*
PD1142-3	66-88*
BA3010-1	68-75
BA3010-2	75-81
BA3010-3	81-88

***Exact frequencies must be specified.**



PD1142 BA3010

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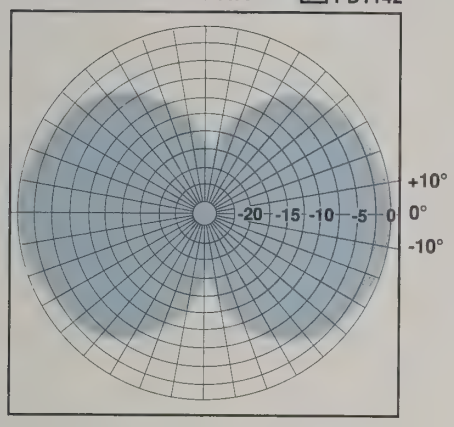
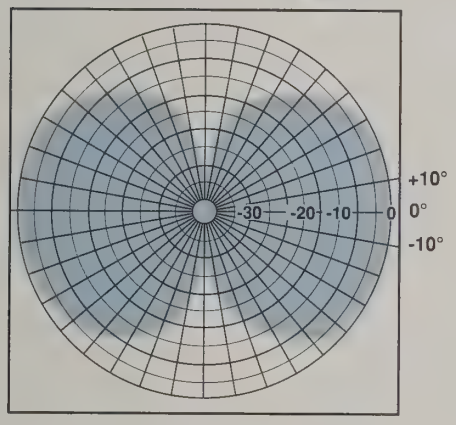
Fiberglass Omnidirectional Antennas

VERTICAL PATTERN ☐ PD1142



VERTICAL PATTERN ☐ BA3010



ELECTRICAL SPECIFICATIONS	PD1142		BA3010
Frequency Range - MHz	25-54	66-88	66-88
Gain - dBd	Unity		Unity
Bandwidth - MHz for 1.5:1 VSWR	.4	.9	7
Vertical Beamwidth 1/2 Power Points	75°	75°	90°
Maximum Power Input - Watts	250		250
Lightning Protection	Direct Ground		Direct Ground
Termination - Direct Fixed	UHF female		N-female
Flexible Extension - Supplied	18 in. (457 mm) RG8A/U Flexible Cable with UHF male and N-male Connectors Attached		None

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD1142 @ 30 MHZ	PD1142 @ 66MHZ	BA3010
Overall Length - ft. (m)	16 (4.88)	8.2 (2.50)	8.1 (2.47) @ 70 MHz
Whip Length - ft. (m)	6.7 (2.04)	2.4 (.73)	—
Element Housing Length - ft. (m)	8.3 (2.54)	4.8 (1.46)	7.1 (2.15)
Support Pipe Diameter - in. (mm)	1.66 (.42)	1.66 (.42)	—
Support Pipe Mounting Length - ft. (m)	1 (.31)	1 (.31)	—
Weight - lbs. (kg)	10 (4.5)	7 (3.2)	13.2 (5.98)
Radiating Element Material	Copper Alloy		Copper Alloy
Element Housing Material	Fiberglass		Fiberglass
Support Pipe Material	6061-T6 Aluminum		Aluminum
Wind Loading Area Flat Plate Equivalent - $ft.^2$ (m^2)	.075 (.07)	.045 (.04)	1.4 (.13) @ 70 MHz
Rated Wind Velocity - mph (km/hr)	100 (161)	125 (201)	125 (201)
Lateral Thrust @ 100 mph - lbs. (kg)	30 (13.6)	18 (8.2)	56 (25.4)
Bending Moment 1 in. (25 mm) Below Top of Support Pipe @ 100 mph - ft./lbs. (m/kg)	170 (23.6)	60.2 (8.3)	202 (28.0)
Mounting Hardware - Supplied			
PD1142	Slimline Clamp Set for structures have 1-1/2 in. (38 mm) to 3-1/4 in. (82 mm) diameter pipe or up to a 3 x 3 in. (76 x 76 mm) angle member.		
BA3010	Stainless Steel hardware supplied permits the antenna to be mounted with feed cable running inside a support pipe of 1-1/2 – 2-1/8 in. (38-54 mm) outer diameter or with feed cable outside a support pipe of 3/4 – 2-1/8 in. (20-58 mm) outer diameter.		
Mounting Hardware - Optional		PD46 Clamp Set	
PD1142	PD52-5 adapter modifies support pipe for 1-1/4 in. mounting. PD25-5 Mounting Kit contains ratchet mount and upper support.		
Shipping Weight - lbs. (kg)	20 (9.1)	10 (4.5)	30.9 (14)
Shipping Volume - $ft.^3$ (m^3)	.76 (0.02)	.51 (0.015)	1.1 (.03)
Shipping Mode	Common Carrier	UPS	BA3010-1 C.C. BA3010-2 UPS BA3010-3 UPS

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Omnidirectional 3 dBd Gain Antenna

PD315* Full Wave Collinear Antenna

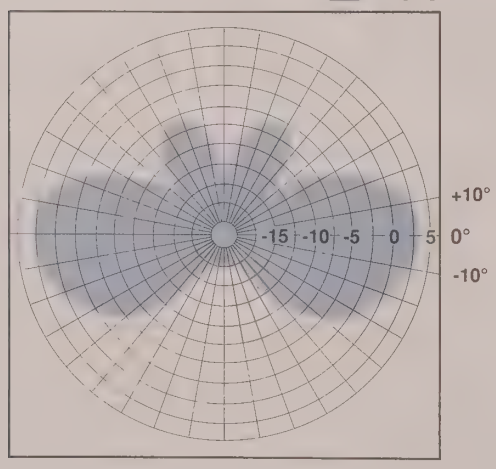
***Exact frequencies must be specified.**

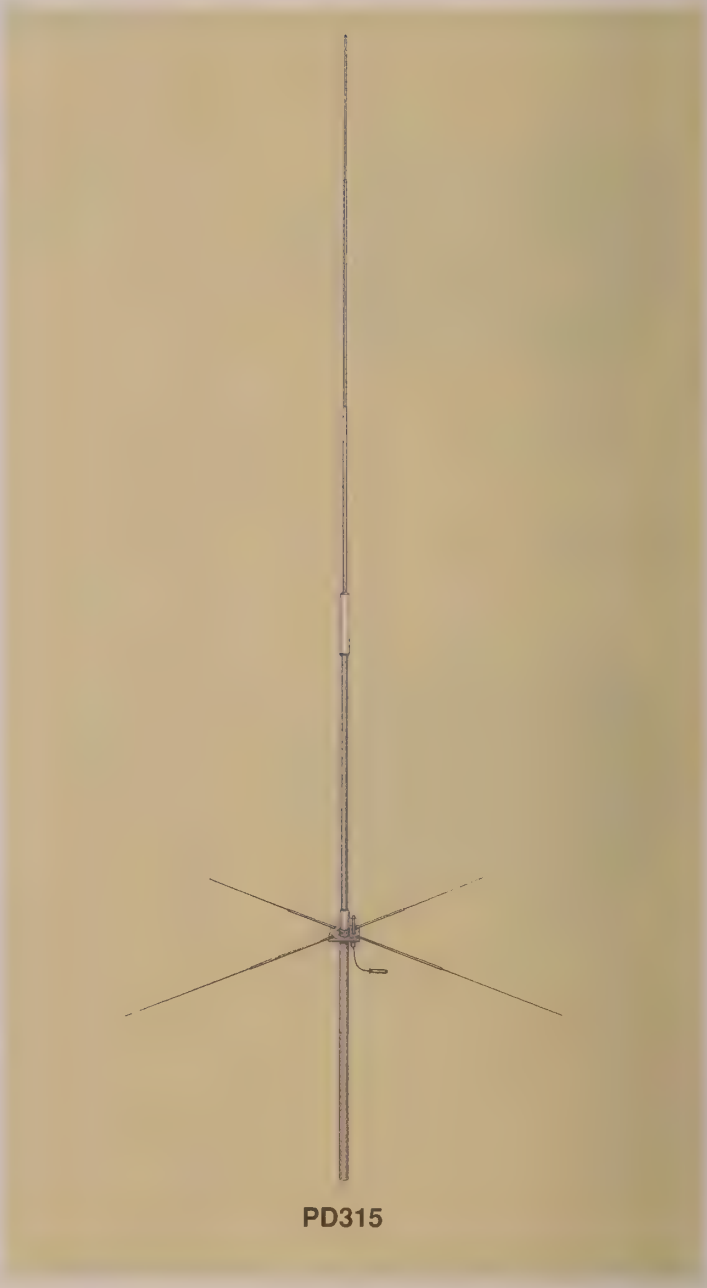
This full wavelength collinear antenna is made for low band applications. Key features include high electrical efficiency and self supporting mounting configuration.

The antenna consists of two sections, a 5/8 wave upper radiating element fed in phase with 3/8 wave lower radiating element. A phasing unit made of 1/4 in. (6 mm) diameter solid rod sealed in a fiberglass housing joins the two elements. The entire antenna has a direct ground potential and is capable of operating successfully in areas of high lightning incidence. The upper element is fabricated of high strength aluminum alloy. The lower element is heavy wall pipe heliarc welded into the base of the aluminum support pipe. The radials are spring-tempered stainless steel.

- **Direct ground** — Protects against lightning damage.
- **Fiberglass enclosed phasing coils** — Protects radiating elements in corrosive environments.

VERTICAL PATTERN ☐ PD315





PD315

Ordering Information*

Item Number	Frequency Range - MHz
PD315-2	30-54
PD315-3	66-88

***Exact frequencies must be specified.**

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Omnidirectional 3 dBd Gain Antenna

ELECTRICAL SPECIFICATIONS	PD315-2	PD315-3
Frequency Range - MHz	30-54	66-88
Gain - dBd	3	3
Bandwidth - MHz for 1.5:1 VSWR	0.8	1.5
Vertical Beamwidth 1/2 Power Points	38°	38°
Maximum Power Input - Watts	500	500
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Fixed	UHF female	UHF female
Flexible Extension - Supplied	18 in. (457 mm) RG8A/U Flexible Cable w/N-male Connector Attached	

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD315-2 @ 30 MHz	PD315-3 @ 66 MHz
Overall Length - ft. (m)	39 (11.9)	22 (6.74)
Radiating Element Length - ft. (m)	34 (10.4)	17 (5.18)
Ground Plane Radial Length - ft. (m)	10 (3.05)	4.5 (1.37)
Support Pipe Diameter - in. (mm)	2-7/8 (73)	2-7/8 (73)
Support Pipe Mounting Length - ft. (m)	4 (1.22)	4 (1.22)
Weight - lbs. (kg)	75 (34)	60 (27)
Radiating Element Material	6061-T6 Aluminum (Lower Section)	6061-T6 Aluminum (Lower Section)
Ground Plane Radial Material	17-7PH Stainless Steel	6061-T6 Aluminum
Support Pipe Material	6061-T6 Aluminum	6061-T6 Aluminum
Wind Loading Area Flat Plate Equivalent - $ft.^2$ (m^2)	2.13 (.198)	1.28 (.119)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	85.2 (38.6)	51.2 (23.2)
Bending Moment 6 in. (152 mm) Below Ground Plane @ Rated Wind - ft./lbs. (m/kg)	1000 (138.3)	330 (46)
Mounting Hardware - Supplied	PD346 Heavy Duty Clamp Set	PD346 Heavy Duty Clamp Set
Shipping Weight - lbs. (kg)	128 (58)	105 (48)
Shipping Volume - $ft.^3$ (m^3)	27 (.77)	17.7 (.50)
Shipping Mode	Common Carrier	Common Carrier

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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Single Yagi Antennas

PD156S*	**7 dBd Gain, 4 Element Single Yagi**
PD390S*	**8 dBd Gain, 5 Element Single Yagi**
PD1158S*	**9 dBd Gain, 6 Element Single Yagi**

***Exact frequencies must be specified.**

Yagi Antennas are commonly used in control station, paging and repeater applications for point to point communications. Their narrow beamwidth and high front-to-back ratio are effective in reducing interference from other systems.

PD156S Single Yagi Antenna is a four element array with its driven element fed through a gamma match assembly to provide a directly grounded structure (66-88 MHz model). This antenna can be oriented for either vertical or horizontal polarization using the mounting hardware provided.

PD390S Single Yagi Antenna is a five element structure that allows either vertical or horizontal polarization using the mounting hardware provided.

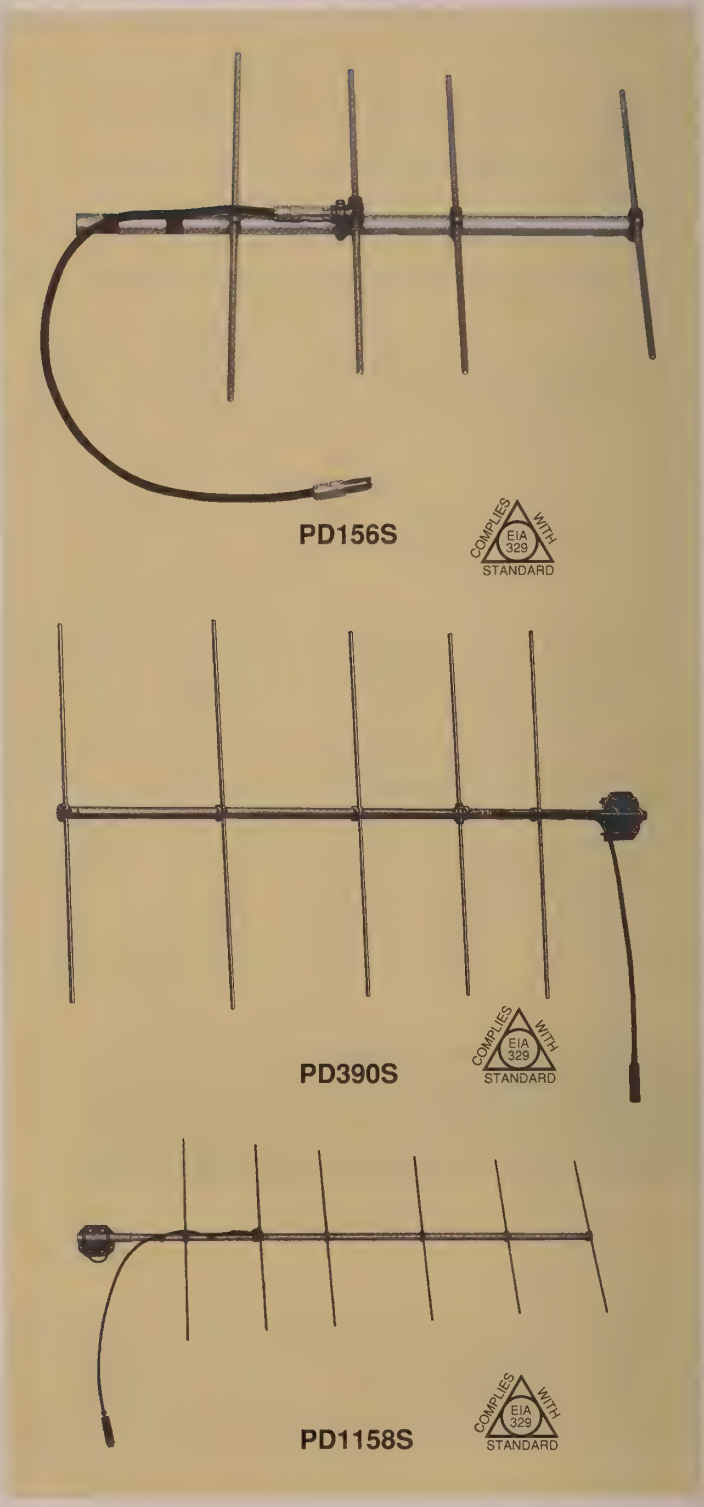
PD1158 Single Yagi Antenna is a six element version of the 390S providing 9 dBd forward gain while maintaining a 20 dB minimum front-to-back ratio. The mounting hardware supplied with this antenna will permit either vertical or horizontal polarization.

- **6061-T6 Aluminum elements** Welded solid rod for high strength, low weight and corrosion resistance.
- **High front-to-back ratio** Minimizes interference from and with other systems.

Ordering Information*

Item Numbers	Frequency Range - MHz
PD156S-3	66-88
PD156S-4	150-174
PD390S-1	144-152
PD390S-2	150-158
PD390S-3	156-164
PD390S-4	162-170
PD390S-5	166-174
PD390S-6	220-225
PD1158S	150-174

***Exact frequencies must be specified.**



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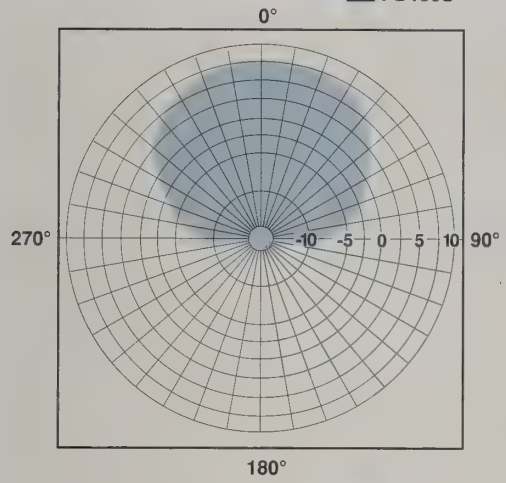
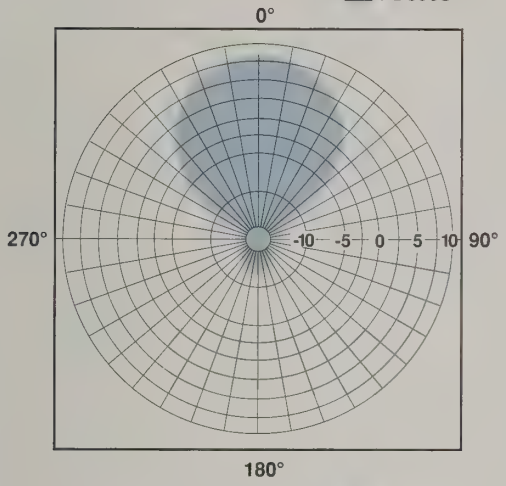
Single Yagi Antennas

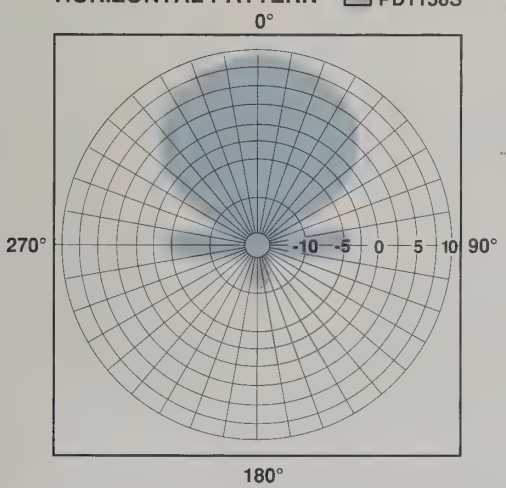
HORIZONTAL PATTERN ☐ PD156S



HORIZONTAL PATTERN ☐ PD390S



HORIZONTAL PATTERN ☐ PD1158S



ELECTRICAL SPECIFICATIONS	PD156S	PD390S	PD1158S
Frequency Range - MHz	66-88 150-174	144-225	150-174
Gain - dBd	7	8	9
Bandwidth - MHz for 1.5:1 VSWR @ 150 MHz	-	8	10
Bandwidth - MHz for 1.6:1 VSWR @ 150 MHz	4*	-	-
Horizontal Beamwidth 1/2 Power Points	80°	72°	62°
Vertical Beamwidth 1/2 Power Points	58°	52°	48°
Maximum Power Input - Watts	500	500	500
Front-to-Back Ratio - dBd	20.0	20.0	20.0
Lightning Protection	Direct Ground		
Termination - Direct Flexible	48 in. (1219 mm) RG8A/U Flexible Cable with N-male Connector Attached		

Note: All VSWR data referenced to 50 Ohms.
*66-88 MHz bandwidth is 1.5 MHz.

MECHANICAL SPECIFICATIONS	PD156S	PD390S	PD1158S
Element Length - in. (mm) @ 150 MHz	39 (991)	40-3/8 (1026)	39 (991)
Element Support Length - in. (mm) @ 150 MHz	53 (1346)	71 (1803)	87 (2184)
Weight - lbs. (kg) @ 150 MHz	5 (2.27)	8 (3.63)	9 (4.08)
Element Material	3/8 in. (10 mm) Diameter 6061-T6 Aluminum Rod		
Element Support Material	1-1/16 in. (27 mm) Diameter 6061-T6 Aluminum Pipe		
Wind Loading Area @ 150 MHz Flat Plate Equivalent - ft.^{2} (m^2)	.521 (.048)	.825 (.077)	.95 (.088)
Rated Wind Velocity - mph (km/hr) @ 150 MHz	120 (193)	100 (161)	100 (161)
Lateral Thrust @ 100 mph @ 150 MHz - lbs (kg)	20.8 (9.5)	33 (15.0)	38 (17.3)
Torsional Moment @ 150 MHz @ 100 mph with Standard Mounting - ft./lbs. (m/kg)	48.6 (6.7)	75 (10.4)	111 (15.4)
Mounting Hardware - Supplied PD156S (66-88 MHz) PD156S (144-174 MHz) PD390S and PD1158	L-Bracket and PD46 Clamp Set PD237 Crossover Plate PD237 Crossover Plate		
Shipping Weight - lbs. (kg)	15 (6.80)	18 (8.16)	20 (9.07)
Shipping Volume - ft.^{3} (m^3)	3 (0.08)	3.7 (0.1)	4.4 (0.12)
Shipping Mode	Common Carrier	UPS	Common Carrier

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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Dual Yagi Antennas

PD156D* **9.3 dBd Gain, 8 Element Dual Yagi**

PD390D* **11 dBd Gain, 10 Element Dual Yagi**

PD1158D* **12 dBd Gain, 12 Element Dual Yagi**

***Exact frequencies must be specified.**

PD156D Dual Yagi Antenna is an eight element completely grounded structure with the driven elements shunt fed through a coaxial power divider. This antenna is supplied with hardware to permit mounting for vertical polarization. It is ideal for point-to-point and other directional applications.

PD390D Dual Yagi Antenna consists of two 390S Yagis driven thru a coaxial divider. Except for gain and pattern its electrical characteristics are identical to the 390S.

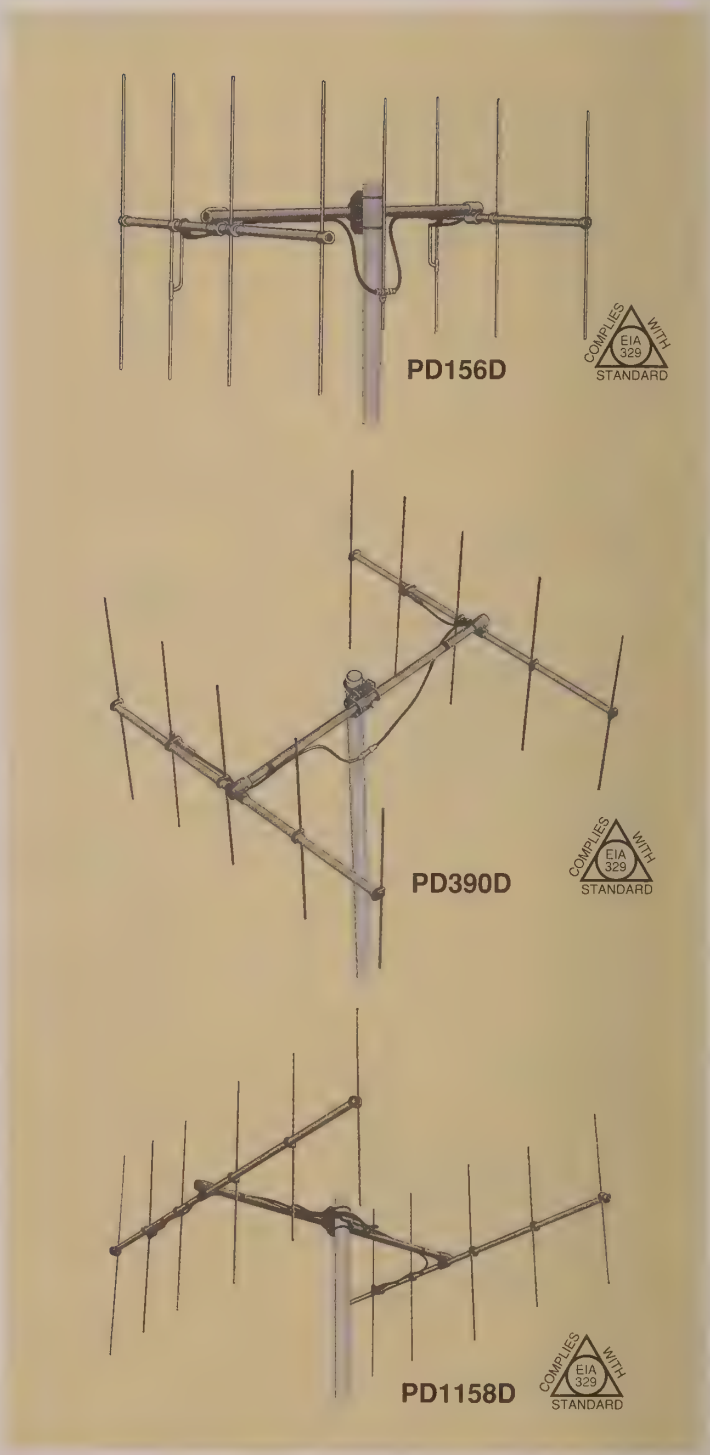
PD1158D Dual Yagi Antenna is a dual version 1158S. Driven elements are fed thru a coaxial power divider. Electrical specifications except for forward gain and pattern characteristics are identical to the 1158S.

- **6061-T6 Aluminum elements** — Welded solid rod for high strength, low weight and corrosion resistance.
- **High front-to-back ratio** — Minimizes interference from and with other systems.
- **Grounded structure** — Protects system from lightning strikes.

Ordering Information*

Item Number	Frequency Range - MHz
PD156D-3	66-88
PD156D-4	144-174
PD390D-1	144-152
PD390D-2	150-158
PD390D-3	156-164
PD390D-4	162-170
PD390D-5	166-174
PD390D-6	220-225
PD1158D	150-174

***Exact frequencies must be specified.**



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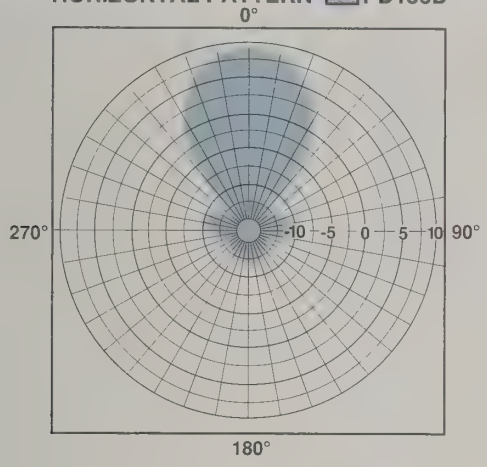
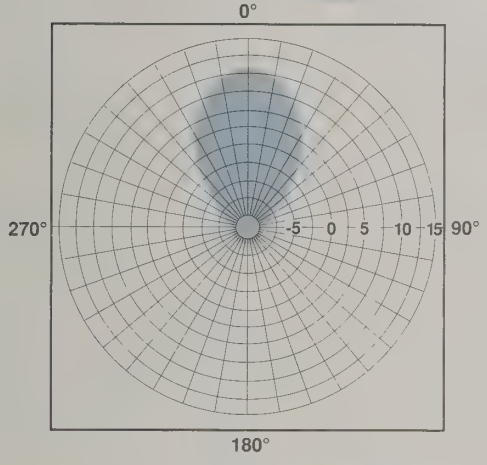
Dual Yagi Antennas

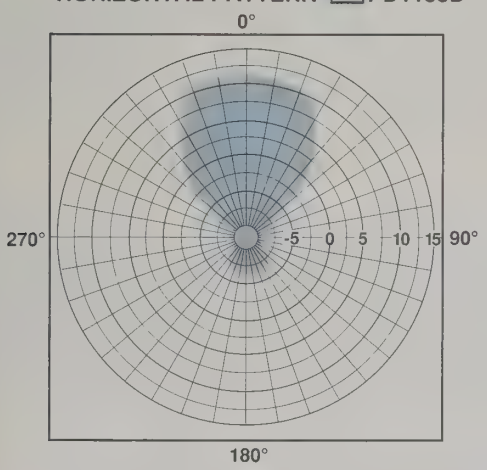
HORIZONTAL PATTERN PD156D



HORIZONTAL PATTERN PD390D



HORIZONTAL PATTERN PD1158D



ELECTRICAL SPECIFICATIONS	PD156D	PD390D	PD1158D
Frequency Range - MHz	66-88 144-174	144-225	150-174
Gain - dBd	9.3	11	12
Bandwidth - MHz for 1.5:1 VSWR @ 150 MHz	-	8	10
Bandwidth - MHz for 1.6:1 VSWR @ 150 MHz	4*	-	-
Horizontal Beamwidth 1/2 Power Points	40°	36°	31°
Vertical Beamwidth 1/2 Power Points	58°	52°	48°
Maximum Power Input - Watts	500	500	500
Front-to-Back Ratio - dBd	20.0	20.0	20.0
Lightning Protection		Direct Ground	
Termination - Direct Flexible	N-male	N-male	N-male

Note: All VSWR data referenced to 50 Ohms.
*66-88 MHz bandwidth is 1.5 MHz.

MECHANICAL SPECIFICATIONS	PD156D	PD390D	PD1158D
Element Length - in. (mm) @ 150 MHz	39 (991)	40-3/8 (1026)	39 (991)
Element Support Length - in. (mm) @ 150 MHz	40 (1016)	55 (1397)	70-1/2 (1791)
Antenna Separation - in. (mm) @ 150 MHz	50 (1270)	50 (1270)	50 (1270)
Weight - lbs. (kg) @ 150 MHz	12 (5.44)	19 (8.62)	22 (9.97)
Element Material and Diameter - in. (mm)	6061-T6 Aluminum Rod, 3/8 (10)		
Element Support Material and Diameter - in. (mm)	6061-T6 Aluminum, 1-1/16 (27)		
Spreader Material and Diameter - in. (mm)	6061-T6 Aluminum, 1-5/16 (33)		
Wind Loading Area @ 150 MHz Flat Plate Equivalent - ft.^{2} (m^2)	1.08 (.100)	1.70 (.158)	1.95 (.181)
Rated Wind Velocity - mph (km/hr) @ 150 MHz	120 (193)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs (kg)	43.2 (19.6)	70 (31.8)	75 (34.0)
Bending Moment 24 in. (610 mm) Below Spreader @ 100 mph - ft./lbs. (kg/m)	86.1 (11.9)	136 (18.8)	156 (21.6)
Mounting Hardware - Supplied	PD237 Crossover Plate		
Shipping Weight - lbs. (kg)	20 (9.07)	26 (11.8)	32 (14.5)
Shipping Volume - ft.^{3} (m^3)	4.3 (0.12)	4.9 (0.14)	5.5 (0.16)
Shipping Mode	Common Carrier	UPS	Common Carrier

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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Ground Plane Antennas

PD152* **Unity Gain General Use**
PD453* **Unity Gain Broad Band**
***Exact frequencies must be specified.**

The PD152 is an inexpensive antenna for use where direct ground lightning protection is not a requirement.

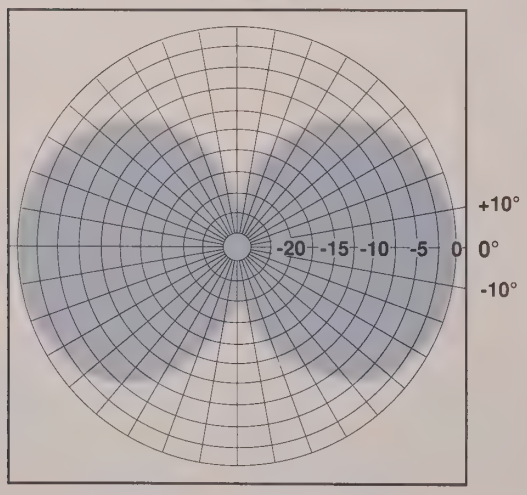
The ground plane structure, consisting of rods in a conical form, assures a precise impedance match at the operating frequency, which can be specified anywhere in the range of 108-512 MHz.

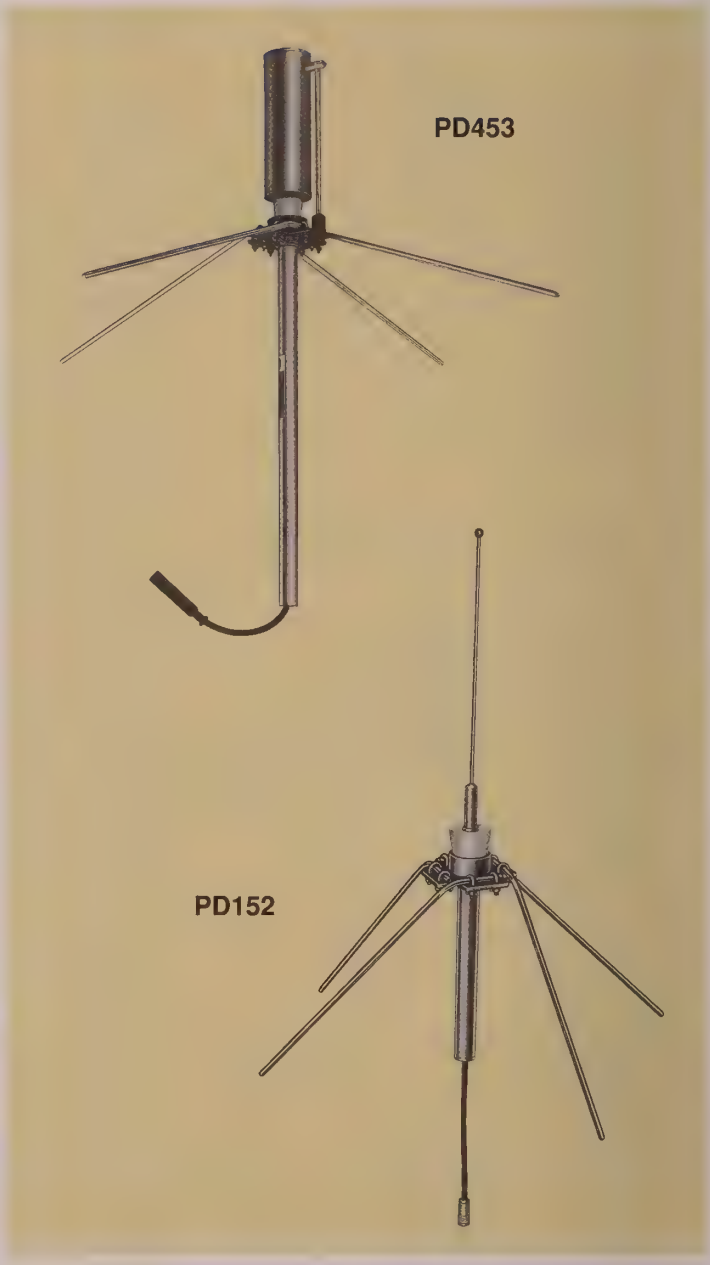
The PD453 is designed for multi-channel applications involving relatively wide frequency excursions such as ground-to-air communication systems. The PD453 offers better than 15% bandwidth capability at under 2.0:1 VSWR between 108 and 174 MHz. This antenna provides DC ground lightning protection.

- **Broad band capability** — Allows use in multi-channel applications.
- **Direct ground (PD453)** — Protects system from lightning strikes and static noise.

VERTICAL PATTERN

PD152 and PD453





Ordering Information*

Item Number	Frequency Range - MHz
PD152-4	108-174
PD152-5	406-512
PD453	108-174

***Exact frequencies must be specified.**

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Ground Plane Antennas

ELECTRICAL SPECIFICATIONS	PD152	PD453
Frequency Range - MHz	108-512	108-174
Gain - dBd	Unity	Unity
Bandwidth - MHz for 2.0:1 VSWR	12 @ 150 MHz	24 @ 150 MHz
Vertical Beamwidth 1/2 Power Points	75°	75°
Maximum Power Input - Watts	500 @ 150 MHz	500 @ 150 MHz
Lightning Protection	Star Gap	Direct Ground
Termination - Direct Flexible	18 in. (457mm) RG8A/U Flexible Cable with N-male Connector Attached	Approx. 18" RG11A/U N-male Attached

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD152	PD453
Overall Length - in. (mm)	42-3/8 (1076) @ 150 MHz	36-5/8 (930) @ 150 MHz
Support Pipe Diameter - in. (mm)	1-15/16 (33)	1-15/16 (33)
Support Pipe Length - ft. (m)	2 (.61)	2 (.61)
Weight - lbs. (kg)	6 (2.7)	14 (6.4)
Radiating Element Material	6061-T6 Aluminum	6061-T6 Aluminum
Ground Plane Radial Material	6061-T6 Aluminum	6061-T6 Aluminum
Support Pipe Material	6061-T6 Aluminum	6061-T6 Aluminum
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	0.08 (.007) @ 150 MHz	0.40 (.037) @ 150 MHz
Rated Wind Velocity - mph (km/hr)	125 (201)	125 (201)
Lateral Thrust @ 100 mph - lbs. (kg)	3.2 (1.5)	16 (7.3)
Bending Moment 1 in. (25 mm) Below Ground Plane @ 100 mph - ft./lbs. (m/kg)	5.1 (0.7)	12.2 (5.5)
Mounting Hardware - Supplied	PD46 Clamp Set	PD46 Clamp Set
Mounting Hardware - Optional	PD246 Pole Mount PD502 Side Mount (Short) PD504 Side Mount (Long)	PD246 Pole Mount PD502 Side Mount (Short) PD504 Side Mount (Long)
Shipping Weight - lbs. (kg)	18 (8.2)	28 (13)
Shipping Volume - ft.³ (m³)	0.75 (0.02)	1.0 (0.03)
Shipping Mode	UPS	UPS

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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Fiberglass Omnidirectional Antennas

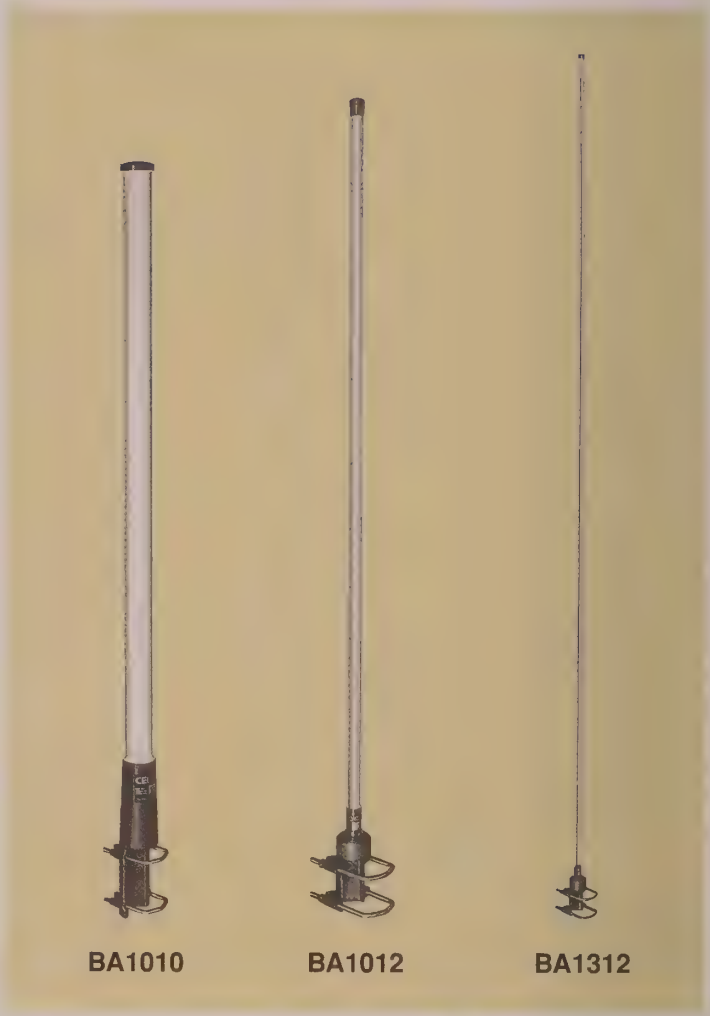
BA1012 **Unity Gain (Light Weight)**
BA1010 **Unity Gain (Heavy Duty)**
BA1312 **3 dBd Gain (Light Weight)**

These antennas feature a very broad frequency band, rugged construction and small size.

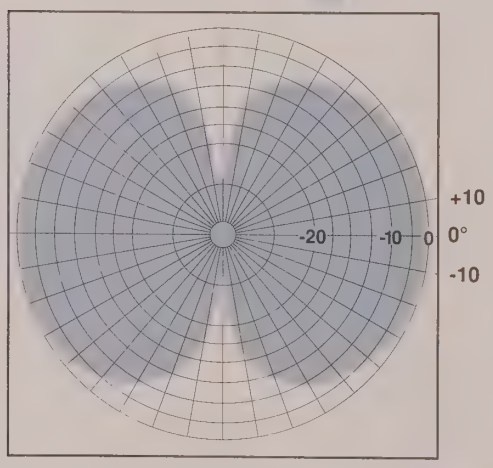
Radiating elements are constructed of copper alloy, encased in a weather resistant low loss fiberglass radome. The BA1010 "Heavy Duty" is permanently affixed to a unique mounting fixture which allows mounting on top of or along-side of most vertical supports. The BA1012 and BA1312 "Light Weight" models terminate in a 1 inch-14 threaded ferrule which attaches directly to the N275F mounting hardware.

Due to their wide bandwidth, they are ideal for use as emergency backup antennas. Their size and mounting fixtures allow for easy storage and fast installation. Alternative mounting hardware is available for most applications.

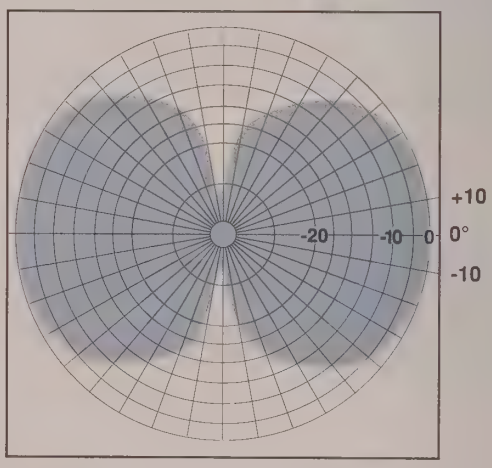
- **Broadband** — Reduces backup inventory and the need for multiple antennas.
- **Fiberglass radome** — Protects radiating elements in hostile environments.
- **Copper elements** — Maximizes system performance while minimizing the possibility of intermod.



VERTICAL PATTERN BA1012



VERTICAL PATTERN BA1010



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Fiberglass Omnidirectional Antennas

ELECTRICAL SPECIFICATIONS	BA1012	BA1010	BA1312
Frequency Range - MHz	118-174	146-174	118-171
Gain - dB	Unity	Unity	3
Bandwidth - MHz @ 150 MHz for 1.5:1 VSWR	18	18	6
Vertical Beamwidth 1/2 Power Points	90°	80°	35°
Maximum Power Input - Watts	100	250	150
Lightning Protection		Direct Ground	
Termination - Direct Fixed		N-female	

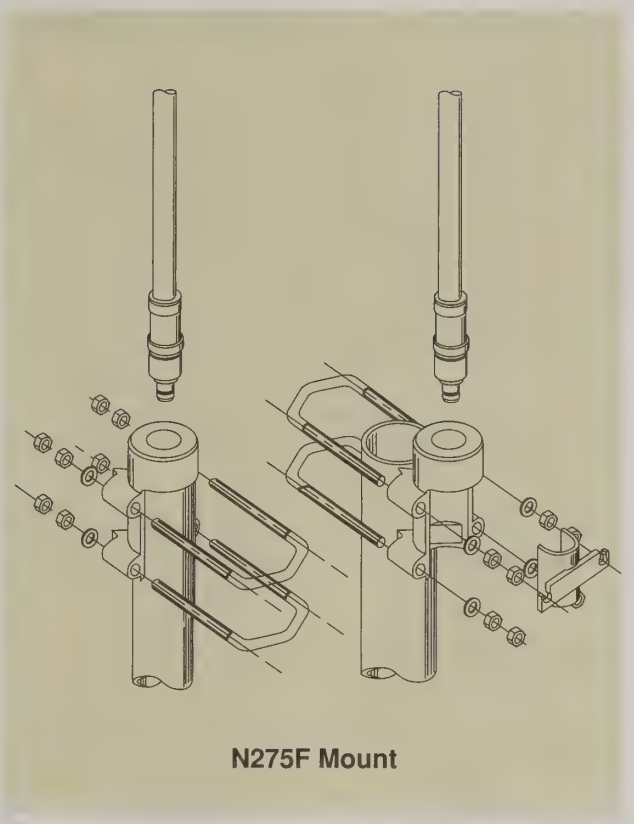
Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	BA1012	BA1010	BA1312
Overall Length - ft. (m)	4.5 (1.37)	4.8 (1.45)	9.2 (2.8)
Element Housing Length - ft. (m)	4.1 (1.26)	3.8 (1.16)	8.8 (2.68)
Weight - lbs. (kg)	1.3 (.589)	8.8 (3.99)	3.75 (1.70)
Radiating Element Material		Copper Alloy	
Element Housing Material		Fiberglass	
Support Pipe Material		Aluminum	
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	.23 (.02)	.86 (.08)	.52 (.049)
Rated Wind Velocity - mph (km/hr)	125 (201)	155 (250)	100 (161)
Lateral Thrust at 100 mph - lbs. (kg)	9.2 (4.2)	34.4 (15.6)	21 (9.5)
Bending Moment @ 100 mph - ft. lbs. (kg/m)	16.6 (2.3)	66.6 (9.2)	93 (12.9)

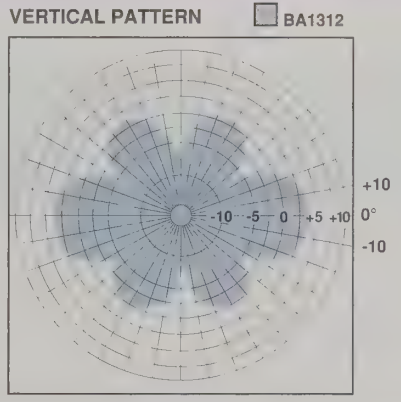
Mounting Hardware - Supplied
BA1012 and BA1312 – N275F universal mast mount is supplied which permits the antenna to be mounted with the feed cable running inside a support pipe of 1-3/8 inch to 1-1/2 inch (35-38 mm) outer diameter or, with feed line running outside a support pipe of 1 to 2-1/4 inch (25-58 mm) outer diameter.

BA1010 – Stainless steel hardware supplied permits the antenna to be mounted with feed cable running inside a support pipe 1-1/2 to 2-1/8 inch (38-54 mm) outer diameter or, with feed cable outside a support pipe of 3/4 to 2-1/8 inch (20-58 mm) outer diameter.

Mounting Hardware - Option		PD10290 Deck Mount	
Shipping Weight - lbs. (kg)	13 (5.89)	19.2 (8.71)	5.03 (2.2)
Shipping Volume - ft.³ (m³)	.24 (.006)	.71 (.02)	.37 (.01)
Shipping Mode	UPS	UPS	C.C.



N275F Mount



Ordering Information

Item Number	Frequency Range - MHz	Item Number	Frequency Range - MHz
BA1012-0	118-174*	BA1010-6	126-138
BA1012-1	144-162	BA1010-7	133-151
BA1012-2	154-174	BA1312-0	118-174*
BA1012-G	118-132	BA1312-1	149-156
BA1010-1	146-164	BA1312-2	156-163
BA1010-2	154-174	BA1312-3	163-171
BA1010-4	114-125		
BA1010-5	120-132		

***Specify exact frequency.**

Fiberglass Omnidirectional Antenna

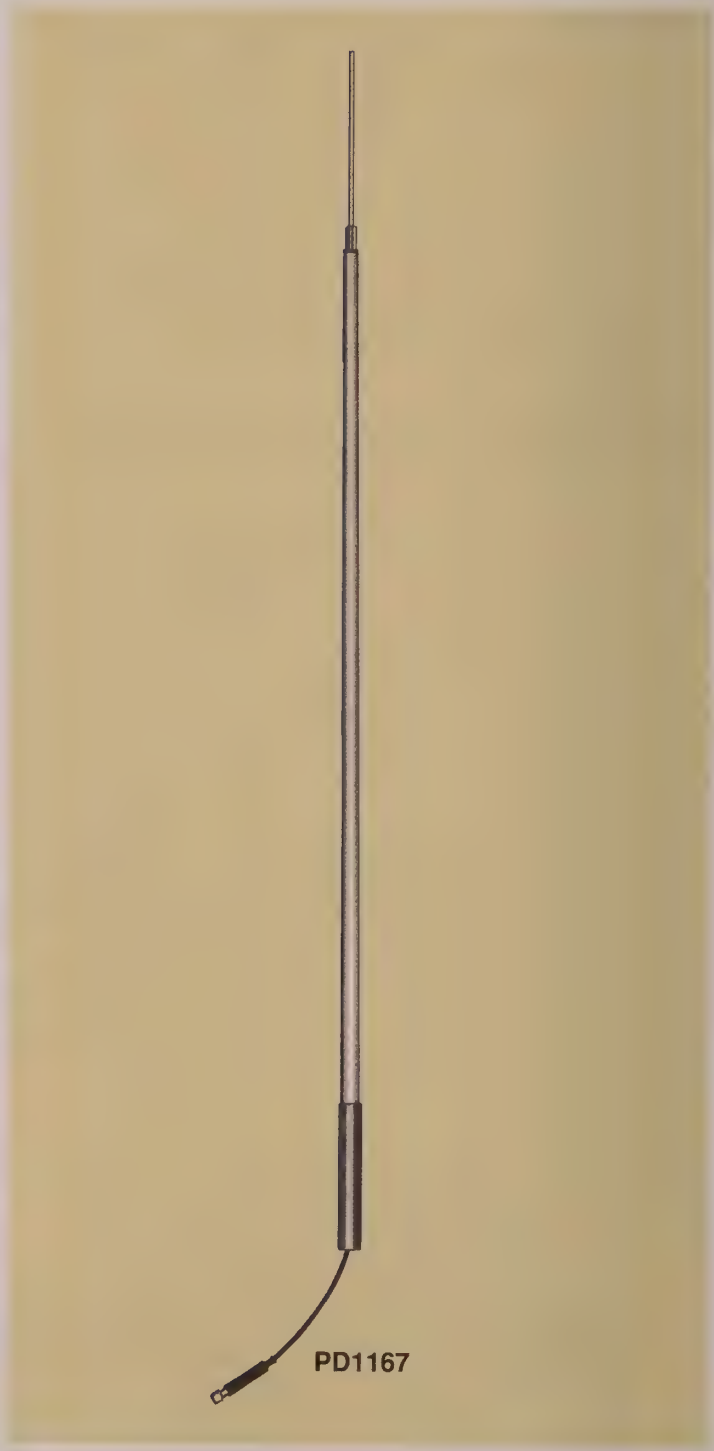
PD1167* **3 dBd Gain Collinear**

***Exact frequencies must be specified.**

This antenna combines the superior performance of an end-fed collinear array with the high strength characteristics and ease of installation of a slim profile fiberglass structure having no ground radials. Heavy wall white fiberglass and 6061-T6 high strength aluminum are the only exposed materials used in the construction of this antenna. The antenna is particularly suitable for use in highly corrosive environments or where mounting restrictions prevent the use of an external ground plane. It may be mounted on conventional marine mounts. *Specify PD52-5 adapter and PD25-5 Mounting Kit.*

- **Fiberglass construction** — Protects radiating elements from hostile environments.
- **Copper elements** — Superior electrical performance.
- **6061-T6 Support** — High strength, inhibits corrosion.
- **Direct ground** — Protects against lightning strikes.

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.



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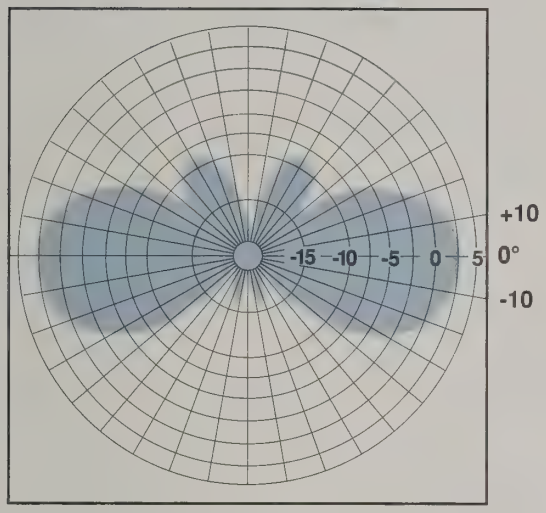
Fiberglass Omnidirectional Antenna

VERTICAL PATTERN ☐ PD1167



ELECTRICAL SPECIFICATIONS	PD1167
Frequency Range - MHz	144-174
Gain - dBd	3
Bandwidth - MHz for 1.5:1 VSWR	6.0
Standard Bandwidths - MHz	Specify Center Frequency
Vertical Beamwidth 1/2 Power Points	36°
Maximum Power Input - Watts	500
Lightning Protection	Direct Ground
Termination - Direct Fixed	UHF-female
Flexible Extension - Supplied	18 in. (457 mm) RG8A/U Flexible Cable with N-male Connector Attached

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD1167
Overall Length - ft. (m)	9.3 (2.83)
Element Housing Length - ft. (m)	7.8 (2.38)
Support Pipe Diameter - in. (mm)	1.66 (42)
Support Pipe Length - in. (mm)	12 (305)
Weight - lbs. (kg)	8 (3.63)
Radiating Element Material	Copper Alloy
Element Housing Material	Fiberglass
Support Pipe Material	6061-T6 Aluminum Pipe
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	1.13 (.105)
Rated Wind Velocity - mph (km/hr)	100 (161)
Lateral Thrust at 100 mph - lbs. (kg)	45.2 (20.5)
Bending Moment 2 in. (50.8 mm) Below Top of Support Pipe @ 100 mph - ft./lbs. (m/kg)	210 (29)
Mounting Hardware - Supplied	PD46 Clamp Set
Mounting Hardware - Optional	PD52-5 Adapter Modifies Support Pipe for 1" - 14" (Threaded) Mounting; PD25-5 Mounting Kit Contains a Chrome Plated Brass Ratchet Mount and Lexan Upper Support.
Shipping Weight - lbs. (kg)	20 (9.1)
Shipping Volume - ft.^{3} (m^3)	76 (.02)
Shipping Mode	144-150 MHz Common Carrier 150-174 MHz UPS

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Broadband Fiberglass Collinear Antennas

PD220 **5.25 dBd Super Stationmaster™**

PD620 **5.25 dBd Heavy Duty Super Stationmaster™**

Both PD220 and PD620 Super Stationmaster VHF base station antennas incorporate the design features of 9 MHz broadband capability, improved lightning protection and true omnidirectional gain in excess of 5 dBd.

The PD620 represents an extra rugged version of the PD220, with specially strengthened housing and support pipe for use in very severe environments. *Note: Below 150 MHz, rated gain for both antennnas is 4.8 dBd due to length constraints.*

Side mounting hardware is available for the PD220 to achieve special radiation patterns. The PD555 reflector assembly may be utilized with the PD220 for both side and top mounted installations. See page 44 on Special Radiation Patterns for details.

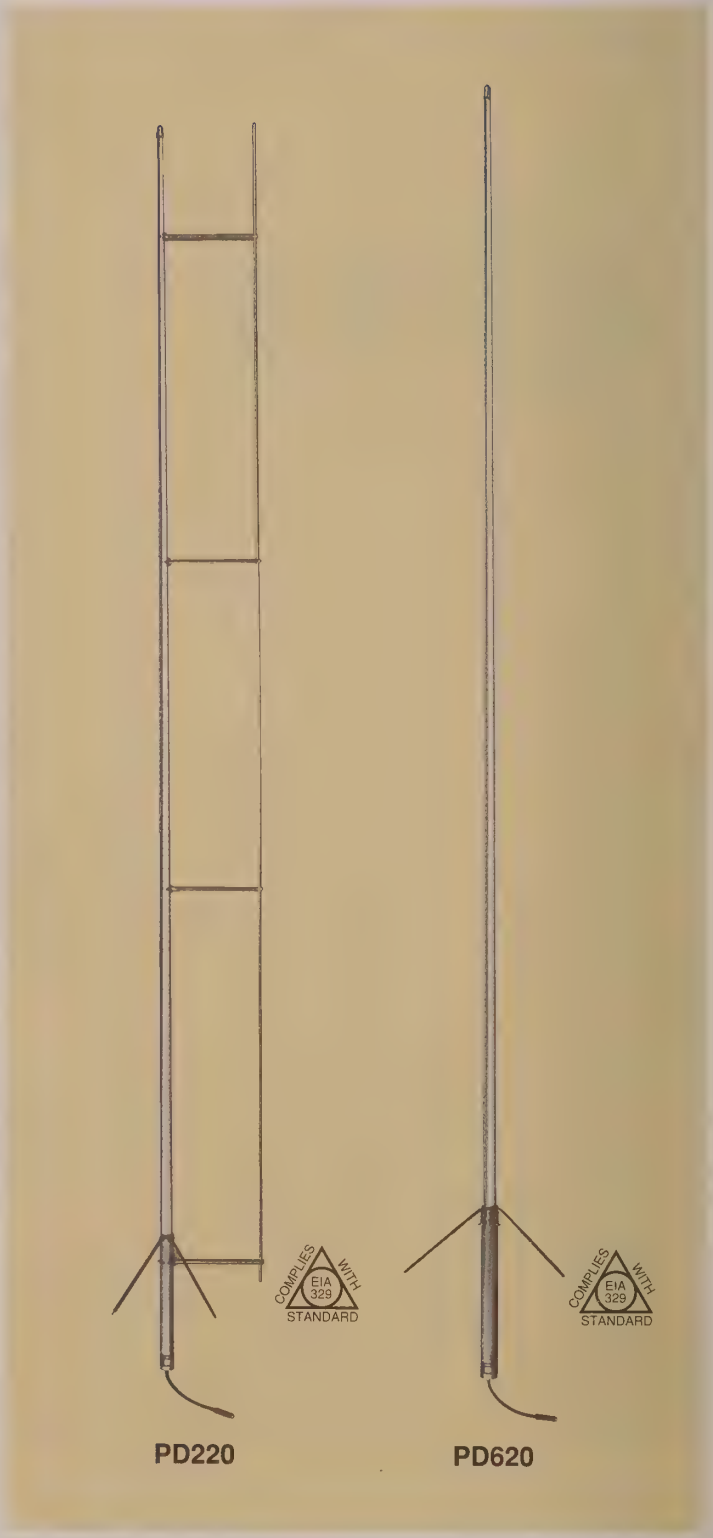
Vertical Beam Downtilt: the PD220-DT and PD620-DT may be ordered with 3° downtilt. *Note: Operational gain and bandwidth are lessened with downtilt. The PD220-DT and PD620-DT are both reduced to 5.0 dBd gain and 1.5 MHz bandwidth. When downtilt antennas are ordered, exact frequency must be specified.*

- **Fiberglass construction** — Protects radiating elements in corrosive environments.
- **DC grounded** — Affords lightning protection.
- **Copper radiating elements** — Minimizes possibility of intermod generation.

Ordering Information

Item No.	Frequency Range - MHz	Item No.	Frequency Range - MHz
PD220-1	136-141	PD620-1	136-141
PD220-2	142-150	PD620-2	142-151
PD220-3A	150.5-158.5	PD620-3	150-159
PD220-3B	151.5-159.5	PD620-4	155-164
PD220-4	155-163	PD620-5	157-166
PD220-5	157-165	PD620-6	160-169
PD220-6	160-169	PD620-7	165-174
PD220-7	165-174		
PD220-8	216-225 (wideband)		
PD220-8A	216-221		
PD220-8B	220-225		

Downtilt Option:
PD220DT and PD620DT - Specify exact frequency.



Broadband Fiberglass Collinear Antennas

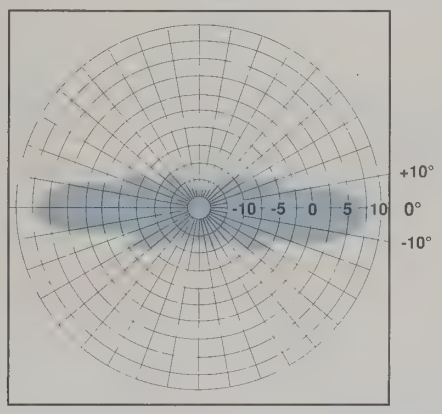
ELECTRICAL SPECIFICATIONS	PD220	PD220-DT	PD620	PD620-DT
Frequency Range	136-174 216-225	136-174	136-174	136-174
Gain - dBd	5.25	5.0	5.25	5.0
Bandwidth - MHz for 1.6:1 VSWR	8.0	1.5	8.0	1.5
Vertical Beamwidth 1/2 Power Points	18°	18°	18°	18°
Maximum Power Input - Watts	500	500	500	500
Lightning Protection	Direct Ground	Direct Ground	Direct Ground	Direct Ground
Termination - Direct Fixed	UHF-female	UHF-female	UHF-female	UHF-female
Flexible Extension - Supplied	18 in. (457mm) RG8A/U Flexible Cable with N-male Connector Attached			

Note: All VSWR data referenced to 50 Ohms.

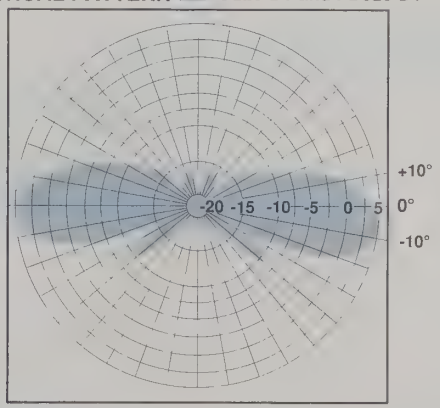
MECHANICAL SPECIFICATIONS	PD220	PD220-DT	PD620	PD620-DT
Overall Length - ft. (m)	22 (6.71)	22 (6.71)	23 (7.01)	23 (7.01)
Element Housing Length - ft. (m)	20 (6.10)	20 (6.10)	20 (6.10)	20 (6.10)
Support Pipe Diameter - in. (mm)	2-3/4 (70)	2-3/4 (70)	3-1/2 (89)	3-1/2 (89)
Support Pipe Mounting Length - in. (mm)	24 (610) Min., Freq. Band Dependent		36 (914)	36 (914)
Weight - lbs. (kg)	23 (10.5)	23 (10.5)	53 (24.1)	53 (24.1)
Radiating Element Material	Copper	Copper	Copper	Copper
Element Housing Material	Fiberglass	Fiberglass	Fiberglass	Fiberglass
Support Pipe Material	6061-T6 Aluminum Pipe	6061-T6 Aluminum Pipe	6061-T6 Aluminum Pipe	6061-T6 Aluminum Pipe
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	1.98 (.184)	1.98 (.184)	2.37 (.220)	2.37 (.220)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)	175 (282)	175 (282)
Rated Wind Velocity with 1/2 in. (13mm) of Radial Ice - mph (km/hr)	85 (137)	85 (137)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	79 (35.9)	79 (35.9)	94.8 (43)	94.8 (43)
Bending Moment 1 in. (25mm) Below top of Support Pipe @ 100 mph (160 km/hr) with No Ice - ft./lbs. (m/kg)	521 (72)	521 (72)	850 (118)	850 (118)
Mounting Hardware - Supplied	PD46 Clamp Set	PD46 Clamp Set	PD346 Clamp Set	PD346 Clamp Set
Mounting Hardware - Optional PD220* PD620*	PD241 Wall Mount, PD246 Pole Mount, PD556 Side Mount (Short), PD503 Side Mount (Long) PD561 Side Mount (Long)			
Shipping Weight - lbs. (kg)	58 (26.4)	58 (26.4)	106 (48.2)	106 (48.2)
Shipping Volume - ft.³ (m³)	2.7 (.08)	2.7 (.08)	5.6 (.16)	5.6 (.16)
Shipping Mode	Common Carrier	Common Carrier	Common Carrier	Common Carrier

*Recommend using PD220 when using side mounting.

VERTICAL PATTERN ☐ PD220 and PD620



VERTICAL PATTERN ☐ PD220-DT and PD620-DT



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Fiberglass Collinear Antenna

PD200* **5.8 dBd Gain Stationmaster™**

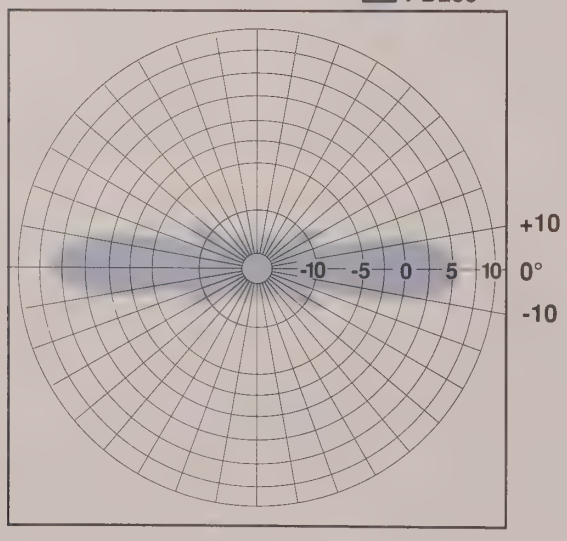
***Specify exact frequency.**

The antennas in this internationally known series are ideal for multiple antenna installations. Each feature multiple collinear radiating copper elements fed in phase and enclosed in a weatherproof fiberglass housing. Able to withstand winds of at least 100 mph, these antennas are equipped with a Teflon® insulated connector at the base of the support pipe, a flexible extension cable with a captive pin N-male connector and a Neoprene weathershield. The PD200 has been specifically designed for simplex systems, dispatch and paging applications in the 120-174 MHz frequency range. Specify center frequency when ordering.

- **Fiberglass construction** — Protects radiating elements in corrosive environments.
- **Copper radiating elements** — Minimizes the possibility of intermod generation.
- **High strength, low cross section** — Withstands winds of up to 100 mph.

Teflon® is a registered trademark of Du Pont.

VERTICAL PATTERN ☐ PD200



PD200

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Fiberglass Collinear Antenna

ELECTRICAL SPECIFICATIONS	PD200
Frequency Range - MHz	120-174
Gain - dBd	5.8 @ 144-174 MHz
Bandwidth - MHz for 1.5:1 VSWR	1.5 @ 150 MHz
Standard Bandwidths - MHz	Specify Center Frequency
Vertical Beamwidth 1/2 Power Points	18°
Maximum Power Input - Watts	500
Lightning Protection	Direct Ground
Termination - Direct Fixed	UHF-female
Flexible Extension - Supplied	18 in. (457 mm) RG8A/U Flexible Cable with N-male Connector Attached

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD200
Overall Length - ft. (m)	20.8 (6.34)
Element Housing Length - ft. (m) @ 150 MHz	19 (5.79)
Support Pipe Diameter - in. (mm)	2-3/8 (60.3)
Support Pipe Mounting Length - in. (mm)	22 (559)
Weight - lbs. (kg)	20 (9.09)
Radiating Element Material	Copper
Element Housing Material	Fiberglass
Support Pipe Material	6061-T6 Aluminum Pipe
Wind Loading Area Flat Plate Equivalent - $ft.^2$ (m^2)	1.13 (.105)
Rated Wind Velocity - mph (km/hr) @150 MHz	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	45 (20.5)
Bending Moment 1 in. (25 mm) Below Top of Support Pipe @ 100 mph - ft./lbs. (m/kg)	425 (58.9)
Mounting Hardware - Supplied	PD46 Clamp Set
Mounting Hardware - Optional	PD241 Wall Mount PD246 Pole Mount PD302 Side Mount (Short) PD303 Side Mount (Long)
Shipping Weight - lbs. (kg)	51 (23.1)
Shipping Volume - $ft.^3$ (m^3)	2.47 (.070)
Shipping Mode	Common Carrier

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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Special Radiation Patterns for VHF and UHF

Stationmaster® & Super Stationmaster™ Series Antennas

The design of this antenna series readily lends itself to use in special radiation pattern applications. Radiation power can be redirected to create additional gain areas or a quiet zone area through the use of a reflector assembly, by side mounting, or by phasing two antennas.

Omnidirectional antennas will exhibit a directional pattern when side mounted (Figure 1). Two top mounted antennas when fed in-phase can also be used to provide a bi-directional pattern (Figure 2).

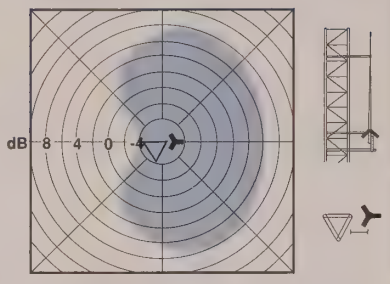
Figure 3 illustrates the narrow, high gain pattern of a side mounted PD220 antenna with PD555 reflector assembly. Figure 4 demonstrates a wide directional pattern of a top mounted antenna with reflector assembly.

We can calculate patterns for specific mounting configurations and antenna product. Contact our Customer Service Department with your particular mounting constraints and pattern needs.

TABLE OF REFLECTOR ASSEMBLIES

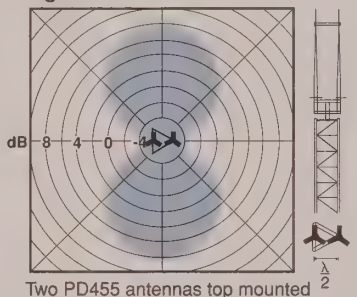
Celwave Antenna PD Number	Reflector Assemblies
PD200	PD1001
PD201	PD671
PD220	PD555
PD400	PD568
PD455	PD568
PD458-2	PD10000
PD755	PD10049
PD1151	PD1007
PD1150	PD1009

Figure 1



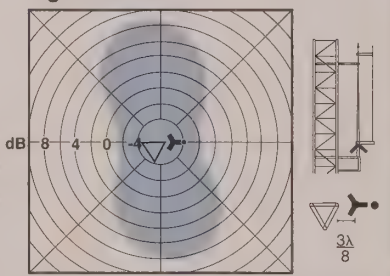
Side-mounted PD220 antenna shown on an 18 inch tower for 180° sector coverage.

Figure 2



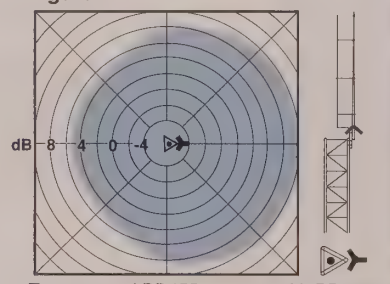
Two PD455 antennas top mounted and fed in phase provide bi-directional coverage.

Figure 3

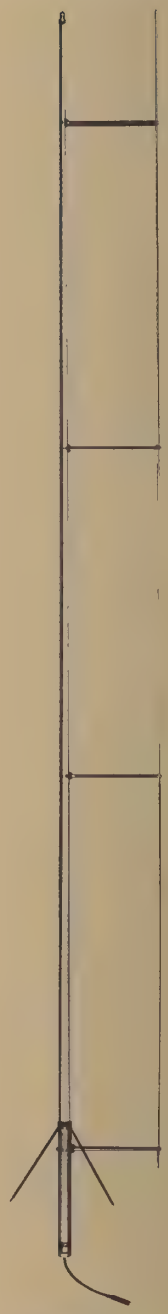


Side-mounting PD220 antenna with PD555 Reflector assembly as shown on an 18 inch tower face for broadside coverage.

Figure 4



Top-mounted PD455 antenna with PD568 Reflector assembly to provide a 5 dBd front-to-back ratio.



PD555 Reflector Assembly

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Exposed Dipoles

PD1121* **3 dBd Gain Offset**
PD344* **4.5 dBd Gain Offset**

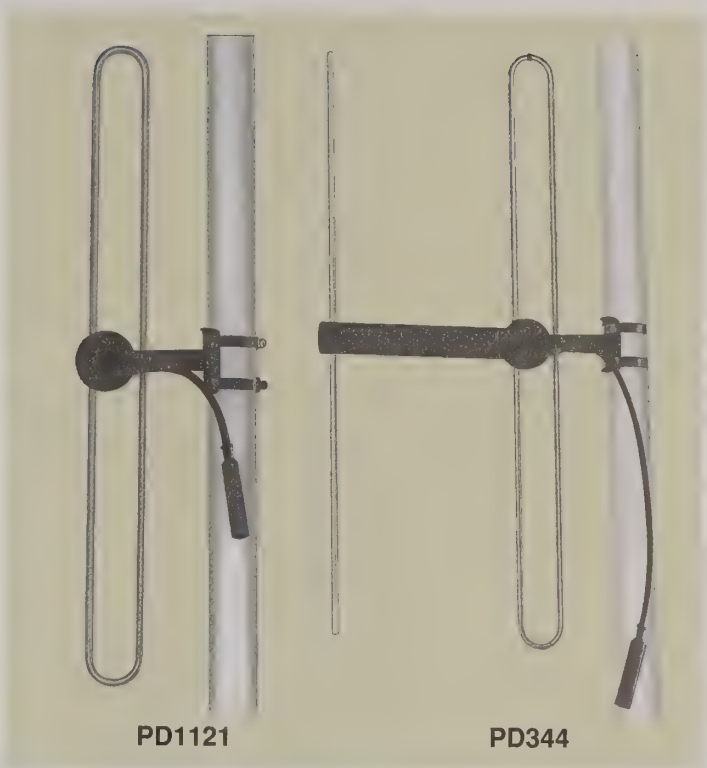
***Exact frequencies must be specified.**

These Celwave side mount dipole antennas have been designed to provide economical offset gain radiation patterns.

The PD1121 consists of a single dipole assembly with RG11A/U matching transformer and is supplied less the support pipe.

The PD344 is a single folded dipole and director rod assembly providing 4.5 dBd offset gain in the 144-174 MHz frequency range.

- **Solid rod 6061-T6 radiators** Minimizes possibility of physical damage.
- **Molded insulators** Improved resistance to temperature and humidity extremes.

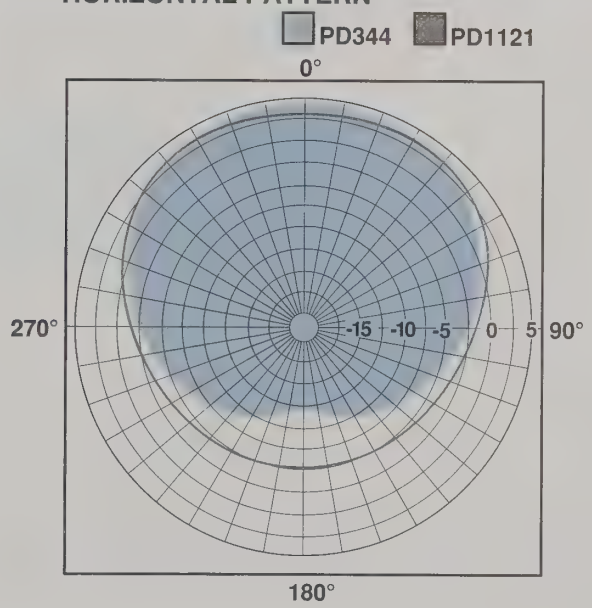


Ordering Information*

Item Number	Frequency Range - MHz
PD1121-1	144-152
PD1121-2	146-154
PD1121-3	149-155
PD1121-4	152-158
PD1121-5	154-160
PD1121-6	154-162
PD1121-7	156-164
PD1121-8	159-165
PD1121-9	160-168
PD1121-10	163-169
PD1121-11	164-172
PD1121-12	166-172
PD1121-13	168-176
PD1121-14	170-178
PD344	148-174

***Exact frequencies must be specified.**

HORIZONTAL PATTERN



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Exposed Dipoles

ELECTRICAL SPECIFICATIONS	PD1121	PD344
Frequency Range - MHz	144-178	148-174
Gain - dB	3	4.5
Bandwidth - MHz for 1.5:1 VSWR	6	4
Horizontal Beamwidth 1/2 Power Points	Dependent Upon Tower	
Vertical Beamwidth 1/2 Power Points	80°	60°
Maximum Power Input - Watts	250	250
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Flexible	18" (457 mm) RG11A/U Cable with N-male Connector Attached	18"(457 mm) RG8A/U Cable with N-male Connector Attached

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD1121	PD344
Overall Length - in. (mm) @150 MHz	35-5/8 (905)	35-5/8 (905)
Weight - lbs. (kg.)	3 (1.36)	5 (2.27)
Radiating Element Material	3/8 in. (9.53 mm) 6061-T6 Aluminum Rod	
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	0.23 (.021)	0.35 (.033)
Rated Wind Velocity - mph (km/hr.)	100 (161)	100 (161)
Lateral Thrust at 100 mph - lbs. (kg)	9 (4.1)	14 (6.3)
Torsional Moment @ 100 mph w/std. Mounting - ft. lbs. (mkg)	3 (.42)	9 (1.25)
Mounting Hardware - Supplied	Stainless Steel Clamps Mounts to 2-1/2 in. (63.5 mm) Diameter Pipe	
Shipping Weight - lbs. (kg)	10 (4.5)	15 (6.8)
Shipping Volume - ft.^{3} (m^3)	1.0 (.028)	1.5 (.04)
Shipping Mode	UPS	UPS

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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Broadband Exposed Dipole Array

PD654 **9 dBd Gain Omni, 12 dBd Gain Offset**

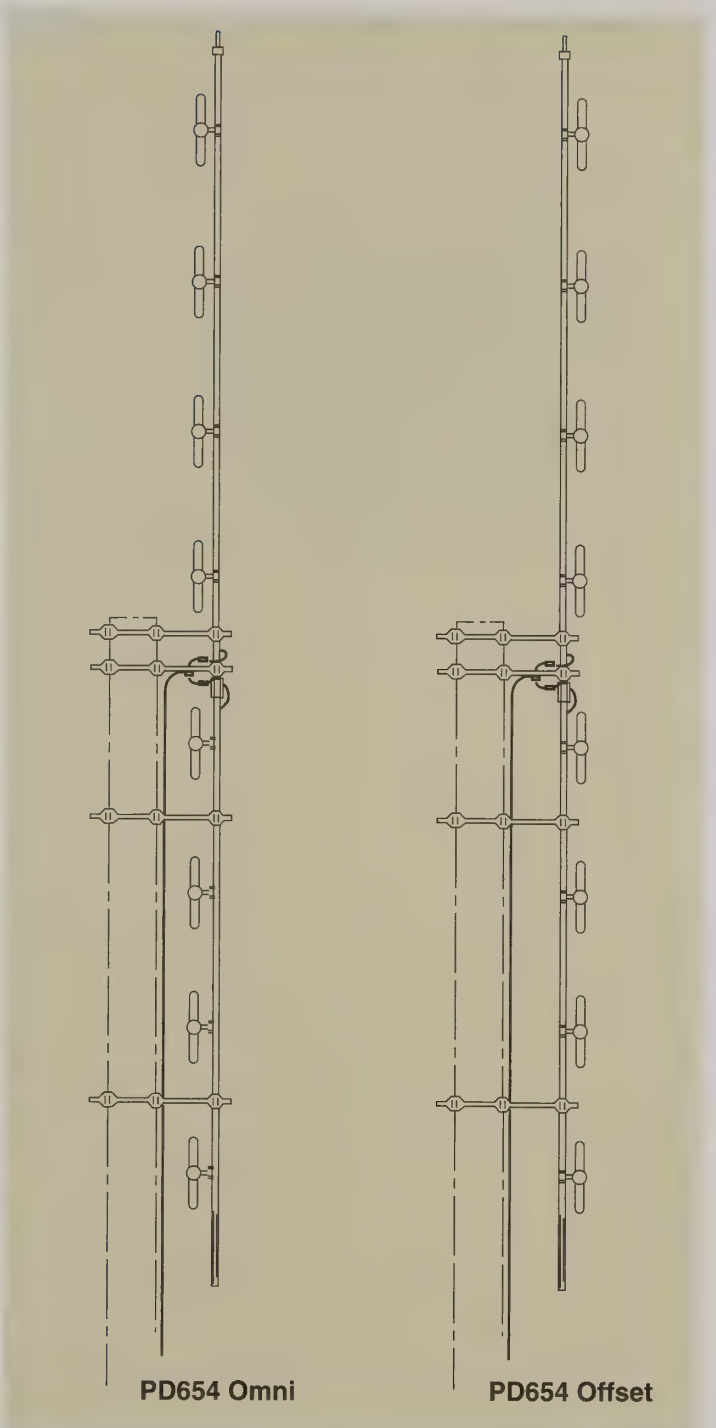
This rugged array consists of two modified PD340 antennas for a total of eight elements. It is typically sidemounted with its upper half extending above the tower with all mounting hardware provided. These models are shipped standard in two sections and feature 6061-T6 aluminum radiating elements, molded feed point insulations, internal harness cabling, stainless steel element clamps and heavy gauge aluminum lightning spike. Radiation pattern is field adjustable and four piece support mast is available to reduce shipping length. *Specify PD654FP.*

- **Solid rod radiators** Minimizes risk of damage.
- **Weatherproof design** Eliminates moisture problems.
- **Molded insulators** Improved resistance to temperature and humidity extremes.
- **Direct ground** Protects against damage from lightning strikes.

Ordering Information

Item Number Standard	FP Option	Frequency Range - MHz
PD654-3	—	140-150
PD654-1	PD654-FP-1	150-162
PD654-2	PD654-FP-2	162-174

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.



PD654 Omni PD654 Offset

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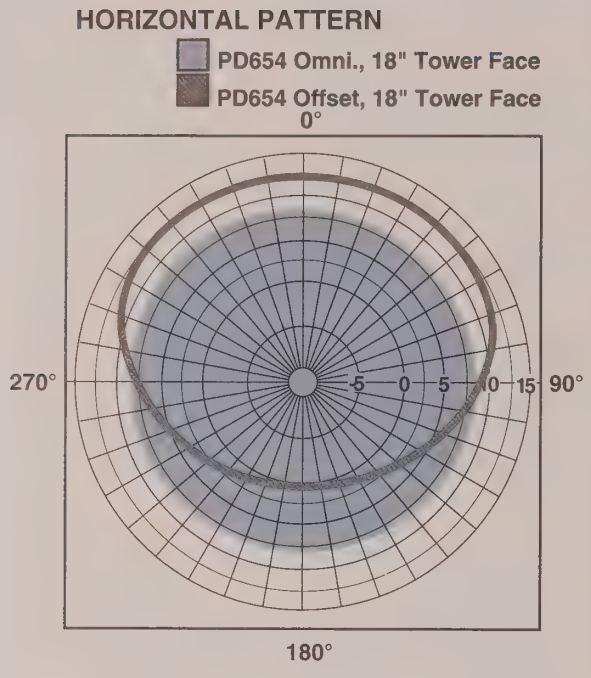
Broadband Exposed Dipole Array

HORIZONTAL PATTERN



ELECTRICAL SPECIFICATIONS	PD654
Frequency Range - MHz	140-174
Gain - dB Omni Offset	9 12
Vertical Beamwidth 1/2 Power Points	8°
Maximum Power Input - Watts	500
Number of Dipoles	8
Lightning Protection	Direct Ground
Termination - Direct Fixed	UHF-female
Flexible Extension - Supplied	N-female

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD654
Overall Length - ft. (m)	45 (13.7)
Support Mast Length - ft. (m)	44 (13.4)
Support Mast Diameter - in. (mm)	2-3/8 (60)
Support Mast Mounting Length - in. (mm)	N/A
Weight, Less Mounts - lbs. (kg)	80 (36.4)
Radiating Element Material	6061-T6 Aluminum
Support Mast Material	6061-T6 Aluminum
Wind Loading Area Flat Plate Equivalent - $ft.^2$ (m^2)	6.25 (.58)
Rated Wind Velocity - mph (km/hr)	100 (161)
Lateral Thrust at 100 mph - lbs. (kg)	250 (114)
Bending Moment 1 in. (25 mm) Below Top of Support Pipe @ 100 mph - ft./lbs. (m/kg)	N/A
Mounting Hardware - Supplied	Two PD502 Sidemount Kits
Shipping Weight - lbs. (kg)	182 (82.7)
Shipping Volume - $ft.^3$ (m^3)	20 (.57)
Shipping Mode	Common Carrier

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Exposed Dipole Arrays

PD440 3 dBd Omni/6 dBd Offset
PD340 6 dBd Omni/9 dBd Offset
PD345 3 dBd Omni/6 dBd Offset Dual

These Celwave broadband antennas provide both omnidirectional and offset configurations.

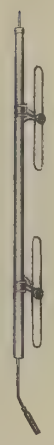
The PD440 is a two dipole structure providing either 3 dBd gain omni or 6 dBd gain offset (field adjustable). Standard bandwidths available are 140-150 MHz, 150-162 MHz, 162-174 MHz and 275-285 MHz. This model is available without its support pipe. *Specify PD440-LSP.*

The PD340 is twice the size of the PD440 and uses four dipoles arranged for either 6 dBd omni or 9 dBd offset. This model is field adjustable for omni or offset patterns, has a full 12 MHz bandwidth and is available in the same frequencies as the PD440. Options include a two piece support mast to reduce shipping length and the unit can be ordered less its support pipe. *Specify PD340-LSP.* When ordering replacement harness for the PD340, specify #022752 and frequency.

- **Solid rod radiators** — Minimizes possibility of damage.
- **Weatherproof design** — Eliminates moisture problems.
- **Molded insulators** — Improved resistance to temperature and humidity extremes.

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

PD440 Omni



PD440 Offset

PD340 Omni

PD345TP Offset

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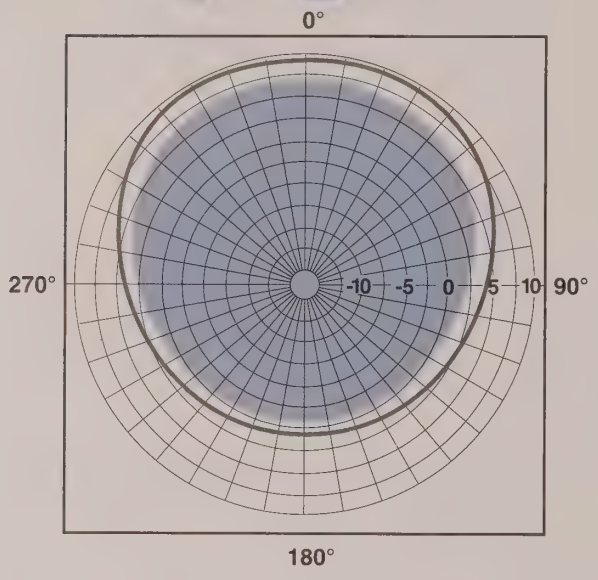
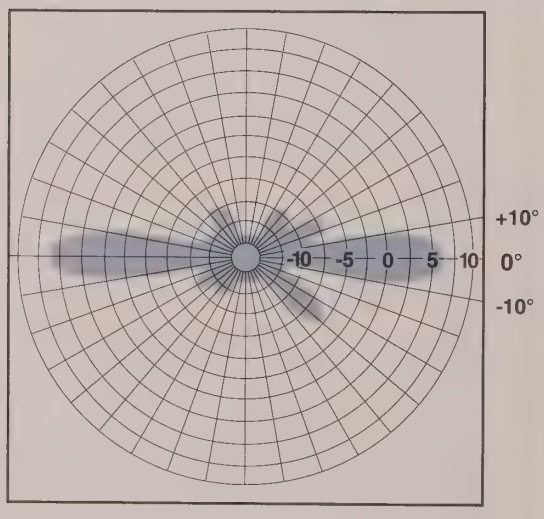
Exposed Dipole Arrays

HORIZONTAL PATTERN (Offset)

PD340 PD345 and PD440



VERTICAL PATTERN PD340



The PD345 Dual Array Antenna is mechanically the same as the 340 Series Broadband Antennas. It consists of two separate antennas. The upper pair of dipoles is fed by one feedline and the lower pair by a second. Thus, this may be used on two separate systems or one half may be used to transmit and the second half to receive. The isolation between the upper pair and the lower pair is in excess of 30 dB.

When ordering separately, specify the frequency range of the upper and lower antenna 140-150 MHz, 150-162 MHz or 162-174 MHz.

Available options include a two piece support mast to reduce the packaged shipping length. *Specify PD345-TP.*

Options:

1. LSP Option - Complete antenna array less support pipe.
   PD340-LSP Shipping weight reduced 60 lbs. (27 kg).
   PD345-LSP Shipping weight reduced 60 lbs. (27 kg).
   PD440-LSP Shipping weight reduced 30 lbs. (14 kg.)
2. TP Option - Support pipe provided in two sections.
   PD340-TP Antenna supplied with joining clamp.
   PD345-TP Antenna supplied with joining clamp.

Ordering Information

Standard	Item No. LSP Option (less support pipe)	TP Option (2-piece pipe)	Freq. Range - MHz
PD440-3	PD440-LSP-3	—	140-150
PD440-1	PD440-LSP-1	—	150-162
PD440-2	PD440-LSP-2	—	162-174
PD440-8			275-285
PD340-3	PD340-LSP-3	PD340-TP-3	140-150
PD340-1	PD340-LSP-1	PD340-TP-1	150-162
PD340-2	PD340-LSP-2	PD340-TP-2	162-174
PD340-5			145-155
PD340-7			230-250
PD340-8		PD340-TP-8	275-285
PD345-1	PD345-LSP-1	PD345-TP-1	150-162
PD345-2	PD345-LSP-2	PD345-TP-2	162-174

Replacement Harness for PD340, #022752 (Specify Frequency)

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Exposed Dipole Arrays

ELECTRICAL SPECIFICATIONS		PD340	PD345	PD440
Frequency Range - MHz		140-285	140-285	140-285
Gain - dBd	(Omni) (Offset)	6 9	3 6	3 6
Bandwidth - MHz 1.5:1 VSWR		12	12	12
Vertical Beamwidth 1/2 Power Points		16°	33°	33°
Maximum Power Input - Watts		500	500	500
Number of Dipoles		4	2 + 2	2
Lightning Protection		Direct Ground	Direct Ground	Direct Ground
Termination - Direct Fixed	@ 140-174 MHz @ 230-285 MHz	UHF-female Type N-male	UHF-female Type N-male	UHF-female Type N-male
Flexible Extension - Supplied		18 inch (457 mm) RG8/U Flexible Cable with N-male Connector Attached		

Note: All VSWR data referenced to 50 ohms.

MECHANICAL SPECIFICATIONS		PD340	PD345	PD440
Overall Length - ft. (m)	@ 140-162 MHz @ 162-174 MHz @ 230-250 MHz @ 275-285 MHz	22.5 (6.85) 22.5 (6.25) 17.5 (5.3) 11.5 (3.5)	22.5 (6.85) 22.5 (6.25)	11.5 (3.51) 11.5 (3.51) 7.5 (2.3)
Support Mast Length - ft. (m)	@ 140-162 MHz @ 162-174 MHz @ 230-250 MHz @ 275-285 MHz	22 (6.71) 20 (6.09) 17.0 (5.2) 11.0 (3.3)	22 (6.71) 20 (6.09)	11 (3.35) 11 (3.35) 7.5 (2.3)
Support Mast Diameter - in. (mm)		2-3/8 (60) Diameter, 5/32 (4) Wall Thickness		
Support Mast Mounting Length - in. (mm)		24 (610)	24 (610)	24 (610)
Weight - lbs. (kg)	@ 140-162 MHz @ 162-174 MHz	40 (18.1) 37 (16.8)	40 (18.1) 37 (16.8)	20 (9.1) 19 (8.6)
Radiating Element Material		6061 T-6 Aluminum		
Support Mast Material		6061 T-6 Aluminum		
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	@ 140-162 MHz @ 162-174 MHz	2.98 (.277) 2.75 (.256)	2.98 (.277) 2.75 (.256)	1.48 (.138) 1.38 (.128)
Rated Wind Velocity - mph (km/hr)		100 (161)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	@ 140-162 MHz @ 162-174 MHz	119 (54.1) 110 (50.0)	119 (54.1) 110 (50.0)	59 (26.8) 55 (25.0)
Bending Moment 1 in. (25 mm)) Below Top of Support Pipe @ 100 mph - ft. lbs. (kg m)	@ 140-162 MHz @ 162-174 MHz	1180 (164) 990 (137)	1180 (164) 990 (137)	295 (41) 247 (34)
Mounting Hardware - Supplied		PD46 Clamp Set		
Mounting Hardware - Optional	PD340 and PD345 PD440 Only	PD502 Sidemount (Short) PD502 Sidemount (Short) and PD504 Sidemount (Long)		
Shipping Weight - lbs. (kg)		90 (41)	90 (41)	54 (25)
Shipping Volume - ft.^{3} (m^3)		6.6 (0.19)	6.6 (0.19)	3.75 (0.11)
Shipping Mode		Common Carrier (All Models)		

WHEN ORDERING:
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Monopole Antennas/ Single Yagi Antenna

PD128 Unity Gain Omnidirectional
PD207 3 dBd Gain Cardioid
PD156S 7 dBd, 4 Element Single Yagi

The PD128 Unity Gain Omnidirectional Monopole, the PD207 3 dBd Cardioid Antenna and the PD156S 7 dBd Gain, Four Element Yagi have been made specifically for use in 280 MHz band paging systems. All three antennas cover the entire 279-281 MHz band without any adjustment.

The PD128 monopole is a small, yet durable antenna, featuring a directly-grounded radiator. The PD207 uses a directive element to give a 3 dBd gain in the forward direction with a 20 dBd front-to-back ratio. This antenna is particularly useful in border areas, where it is desired to provide a low level of signal in the rear of the main coverage area. The PD156S Yagi Antenna is used in point to point applications and when a highly directional signal is desired to restrict a coverage area on the sides as well as in the rear.

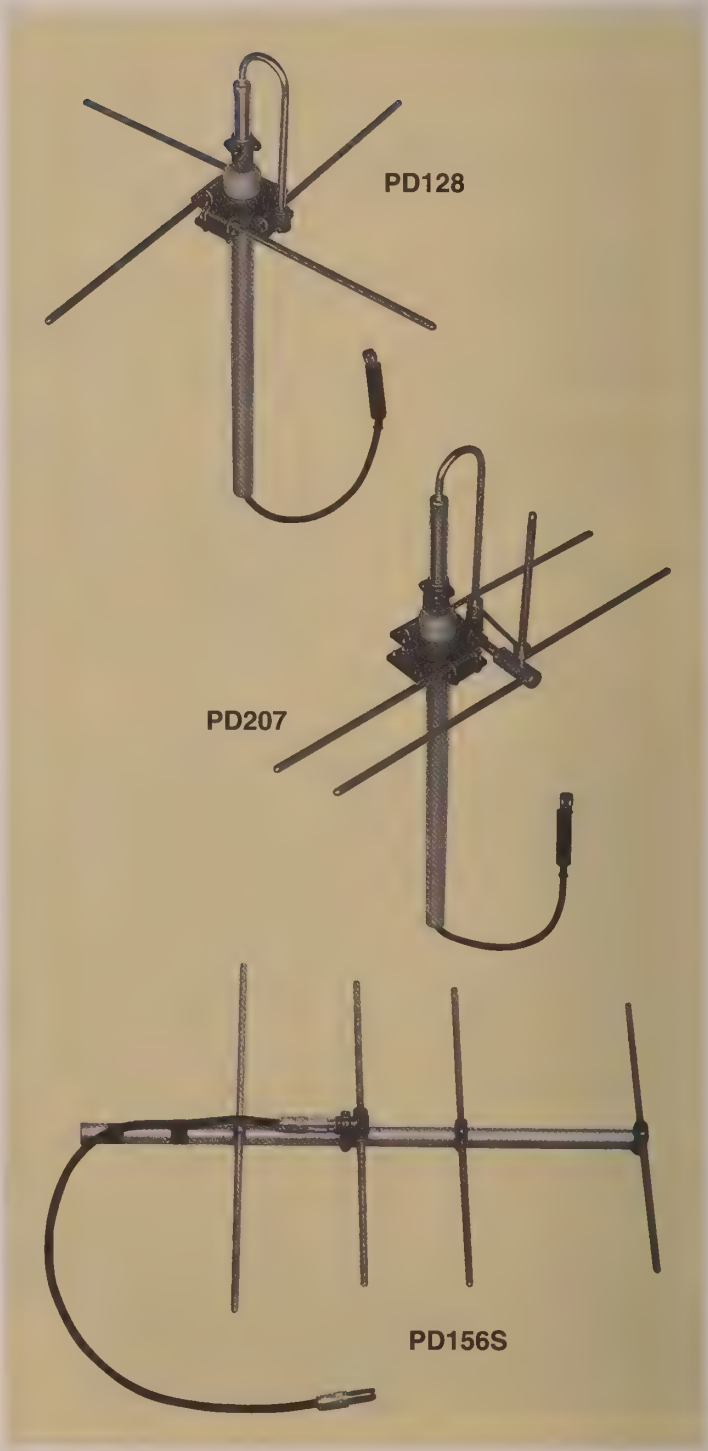
All of these antennas terminate in a type N-male connector with a flexible extension of RG8AU that can be connected directly to the feeder line. The PD128 and PD207 are supplied with a PD46 clamp set for vertical support mounting; the PD156S is supplied with a PD237 crossover clamp set that permits mounting from the rear and orienting in either horizontal or vertical polarization.

- **High-strength 6061-T6 aluminum alloy** — Long service life.
- **End-mounting construction (PD156S)** — Minimizes the effect of the support structure on the radiation pattern.
- **Direct ground (PD128 and PD207)** — Protects against lightning damage.

Ordering Information

Item Number	Frequency Range - MHz
PD128-6	279-281
PD156S-5	279-281
PD207	279-281*

***Specify 279-281 MHz with order.**



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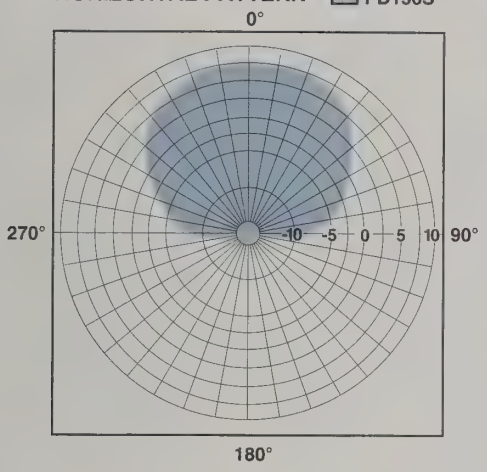
Monopole Antennas/ Single Yagi Antenna

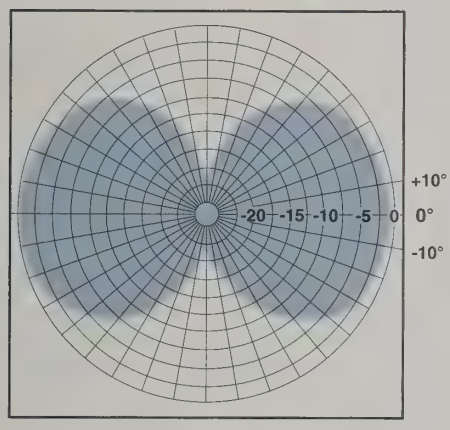
HORIZONTAL PATTERN ☐ PD156S



ELECTRICAL SPECIFICATIONS	PD156S	PD128	PD207
Frequency Range - MHz	279-281	279-281	279-281
Gain - dBd	7	Unity	3
Bandwidth - MHz for 1.5:1 VSWR	2	2	2
Horizontal Beamwidth 1/2 Power Points	80°	–	–
Vertical Beamwidth 1/2 Power Points	58°	76°	76°
Maximum Power Input - Watts	500	500	500
Front-to-Back Ratio - dBd	20	N/A	20
Lightning Protection	Direct Ground	Direct Ground	Direct Ground
Termination - Direct Flexible in. (mm)	48 (1219) RG8A/U Flexible Cable with N-male Connector Attached	18 (457)	18 (457)

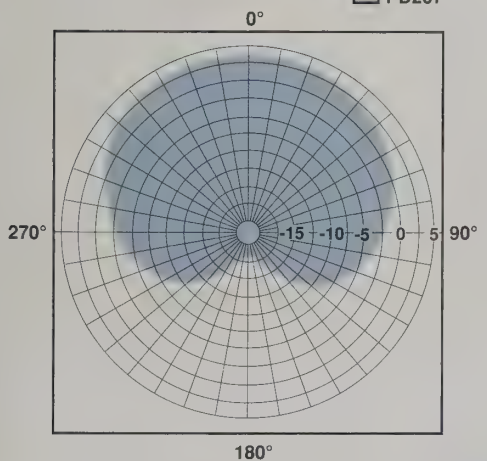
Note: All VSWR data referenced to 50 Ohms.

VERTICAL PATTERN ☐ PD128



MECHANICAL SPECIFICATIONS	PD156S	PD128	PD207
Element Length - in. (mm)	21.5 (546.1)	–	–
Element Support Length - in. (mm)	31 (787.4)	–	–
Overall Length - ft. (m)	–	2.9 (0.88)	2.9 (0.88)
Support Pipe Diameter - in. (mm)	–	1-5/16 (33)	1-5/16 (33)
Mounting Length - in. (mm)	–	24 (610)	24 (610)
Weight - lbs. (kg)	3.8 (1.73)	3.8 (1.73)	4.8 (2.18)
Element Material (PD156S)	3/8 in. (10 mm) Diameter 6061-T6 Aluminum Rod		
Radiating Element Material	–	6061-T6 Aluminum Rod and Pipe	6061-T6 Aluminum Rod and Pipe
Element Support Material (PD156S)	1-1/16 in. (27 mm) Diameter 6061-T6 Aluminum Pipe		
Ground Plane Material	–	6061-T6 Aluminum Rod	6061-T6 Aluminum Rod
Director Material	–	6061-T6 Aluminum Rod	6061-T6 Aluminum Rod
Support Pipe Material	–	6061-T6 Aluminum Pipe	6061-T6 Aluminum Pipe
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	.28 (0.03)	.08 (.007)	.09 (.008)
Rated Wind Velocity - mph (km/hr)	120 (193)	125 (201)	125 (201)
Lateral Thrust @ Rated Wind - lbs (kg)	16.2 (7.4)	5 (2.27)	5.6 (2.6)
Mounting Hardware - Supplied	PD237 Crossover Plate	PD46 Clamp Set	PD46 Clamp Set
Mounting Hardware - Optional (PD128 and PD207)	PD246 Pole Mount, PD502 Side Mount (Short) PD504 Side Mount (Long)		
Shipping Weight - lbs. (kg)	7.8 (3.6)	7.8 (3.6)	8.8 (4)
Shipping Volume - ft.³ (m³)	2.6 (0.07)	0.6 (0.02)	0.6 (0.02)
Shipping Mode	UPS	UPS	UPS

HORIZONTAL PATTERN (Cardioid) ☐ PD207



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Fiberglass Collinear Antennas

PD10191 **Unity Gain Fiberglass Antenna**

PD10204 **3 dBd Gain Fiberglass Antenna**

The PD10191 Unity Gain and PD10204 3 dBd Gain Fiberglass Antennas were specifically designed for use in paging systems in the 280 MHz band. Both antennas cover the entire 279-281 MHz band without any adjustment.

The PD10191, with unity omnidirectional gain, is a small, lightweight, yet durable antenna for many years of roof or tower-top service. The PD10204, with 3 dBd omnidirectional gain, allows the user to make up some or all of the losses incurred in transmission line, filtering or combining systems, to maximize effective radiated power.

Both antennas terminate in a Type N-female connector and are supplied with the rugged PD46 clamp set for mounting on a variety of vertical supports.

- **Copper radiating elements** — Minimized possibility of intermod generation.
- **Fiberglass radome construction** — Protects radiating elements in corrosive environments.
- **Direct ground** — Protects against lightning damage.

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

PD10191 PD10204

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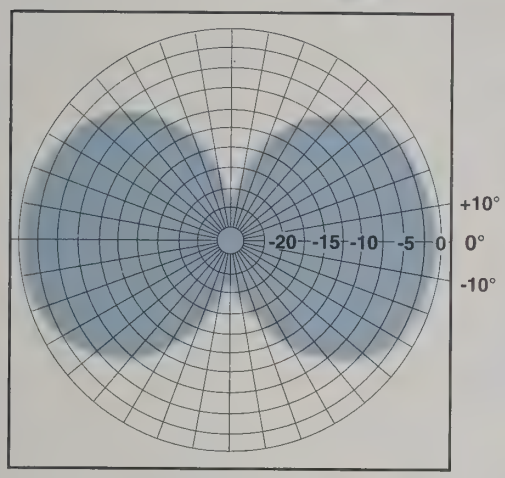
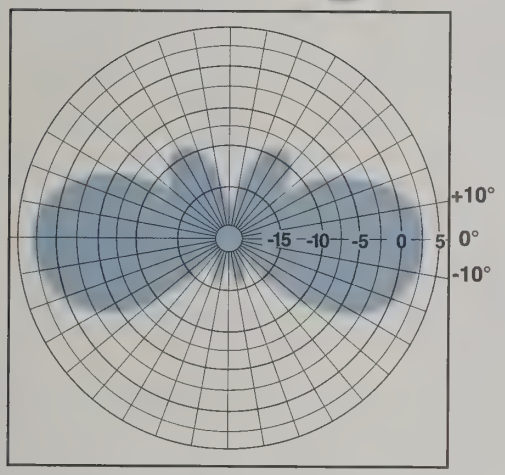
Fiberglass Collinear Antennas

VERTICAL PATTERN ☐ PD10191



VERTICAL PATTERN ☐ PD10204



ELECTRICAL SPECIFICATIONS	PD10191	PD10204
Frequency Range - MHz	279-281	279-281
Gain - dBd	0	3
Bandwidth for 1.5:1 VSWR - MHz	2	2
Vertical Beamwidth 1/2 Power Points	76°	36°
Maximum Input Power - Watts	500	325
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Fixed	N-female	N-female
Flexible Extension - Supplied	18 in. (457 mm) RG8A/U Cable with N-male Connector Attached	18 in. (457 mm) RG8A/U Cable with N-male Connector Attached

MECHANICAL SPECIFICATIONS	PD10191	PD10204
Overall Length - ft. (m)	4 (1.22)	6.3 (2.07)
Element Housing Length - ft. (m)	3 (0.9)	5.3 (1.74)
Support Pipe Diameter - in. (mm)	1.625 (41.3)	1.625 (41.3)
Support Pipe Length - in. (mm)	12 (304.8)	12 (304.8)
Weight - lbs. (kg)	5 (2.27)	8 (3.63)
Radiating Element Material	Copper	Copper
Element Housing Material	Fiberglass	Fiberglass
Support Pipe Material	6061-T6 Aluminum	6061-T6 Aluminum
Wind Loading Area Flat Plate Equiv. - ft.^{2} (m^2)	0.3 (0.28)	0.47 (.043)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)
Lateral Thrust at Rated Wind - lbs. (kg)	12 (5.5)	18.92 (8.6)
Mounting Hardware - Supplied	PD46 Clamp Set	PD46 Clamp Set
Shipping Weight - lbs. (kg)	17 (7.7)	20 (9.1)
Shipping Volume - ft.^{3} (m^3)	0.52 (0.015)	0.72 (0.02)

Fiberglass Omnidirectional Collinear Antennas

BA6012 **Unity Gain (Light Weight)**
BA6110 **Unity Gain (Heavy Duty)**
BA6312 **3 dBd Gain (Light Weight)**

These antennas feature a very broad frequency band, rugged construction and small size.

Radiating elements are constructed of copper alloy, encased in a weather resistant low loss fiberglass radome. The BA6110 "Heavy Duty" is permanently affixed to a unique mounting fixture which allows mounting on top of or along-side of most vertical supports. The BA6012 and BA6312 "Light Weight" models terminate in a 1 inch-14 threaded ferrule which attaches directly to the N275F mounting hardware.

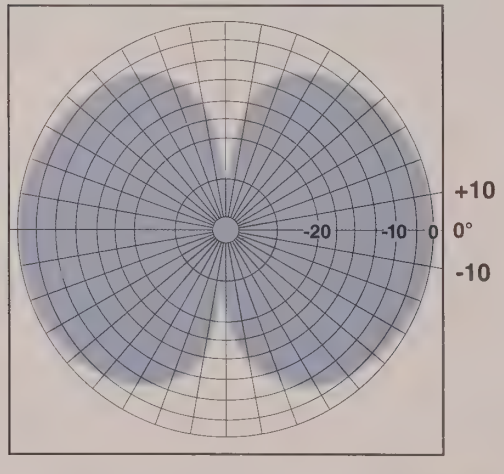
Due to their wide bandwidth, they are ideal for use as emergency backup antennas. Their size and mounting fixtures allow for easy storage and fast installation. Alternative mounting hardware is available for most applications.

- **Broadband** — Reduces backup inventory and the need for multiple antennas.
- **Fiberglass radome** — Protects radiating elements in hostile environments.
- **Copper elements** — Maximizes system performance while minimizing the possibility of intermod.

BA6012
BA6312

BA6110

VERTICAL PATTERN ☐ BA6012



Ordering Information

Item Number	Frequency Range - MHz
BA6012-0	406-512*
BA6012-1	450-470*
BA6012-2	470-490
BA6012-3	490-512
BA6110-1	406-470
BA6110-2	450-512
BA6312-0	406-512*
BA6312-1	449-467
BA6312-2	467-485
BA6312-3	485-503

***Exact frequencies must be specified.**

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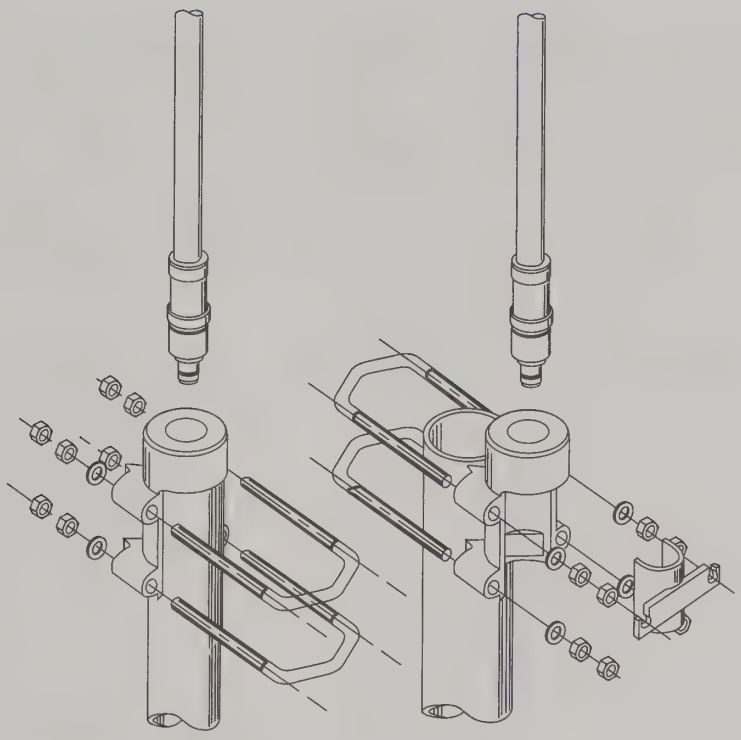
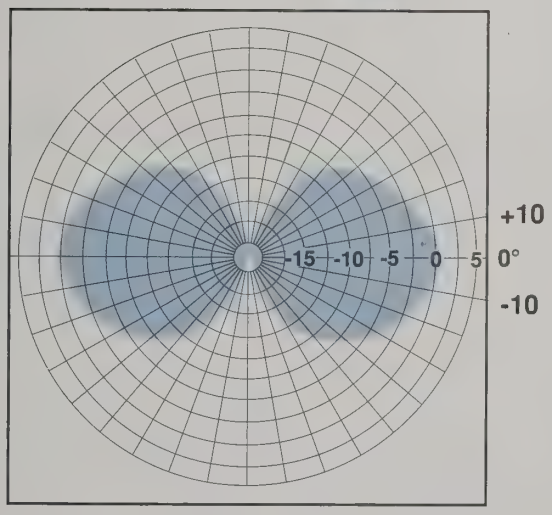
Fiberglass Omnidirectional Collinear Antennas

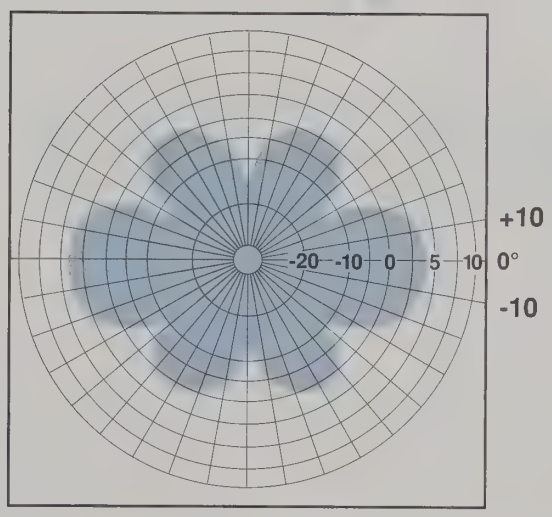


N275F Mount

VERTICAL PATTERN ☐ BA6110



VERTICAL PATTERN ☐ BA6312



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Fiberglass Omnidirectional Collinear Antennas

ELECTRICAL SPECIFICATIONS	BA6012	BA6110	BA6312
Frequency Range - MHz	449-512	406-512	449-503
Gain - dBd	Unity	Unity	3
Bandwidth - MHz for 1.5:1 VSWR	20 @ 450 MHz	70	18 @ 450 MHz
Vertical Beamwidth 1/2 Power Points	90°	66°	29°
Maximum Power Input - Watts	100	250	50
Lightning Protection	Direct Ground	Direct Ground	Direct Ground
Termination - Direct Fixed	N-female	N-female	N-female

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATION	BA6012	BA6110	BA6312
Overall Length - in. (mm)	27.6 (701)	39.4 (1001)	55.2 (1402)
Element Housing Length - in. (mm)	21.6 (549)	27.4 (696)	49.2 (1250)
Weight - lbs. (kg)	1.1 (.50)	7 (3.2)	2.9 (1.3)
Radiating Element Material	Copper Alloy	Copper Alloy	Copper Alloy
Element Housing Material	Fiberglass	Fiberglass	Fiberglass
Support Pipe Material	Aluminum	Aluminum	Aluminum
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	.12 (.01)	.65 (.06)	.25 (.024)
Rated Wind Velocity - mph (km/hr)	155 (250)	186 (300)	155 (250)
Lateral Thrust @ 100 mph - lbs. (kg)	4.8 (2.2)	26 (11.8)	10 (4.5)
Bending Moment @ 100 mph - ft./lbs. (m/kg)	5.4 (7.5)	31.2 (4.3)	15.4 (2.1)
Mounting Hardware - Supplied BA6110	Stainless steel hardware supplied permits the antenna to be mounted with feed cables running inside a support pipe 1-1/2 - 2-1/8 in. (38-54 mm) outer diameter or, with a feed cable outside a support pipe of 3/4 - 2-1/8 in. (20-58 mm) outer diameter.		
BA6012 and BA6312	N275F universal mast mount is supplied which permits antenna to be mounted with the feed cable running inside a support pipe of 1-3/8 - 1-1/2 in. (33-40 mm) outer diameter or, with a feed line running outside a support pipe of 1 - 2-1/4 in. (25-58 mm) outer diameter.		
Mounting hardware - Options BA6012 and BA6312	PD10290 Deck Mount		
Shipping Weight - lbs. (kg)	9 (4.08)	15.4 (6.9)	9 (4.08)
Shipping Volume - ft.^{3} (m^3)	.43 (.012)	.53 (.015)	.61 (.017)
Shipping Mode	UPS	UPS	UPS

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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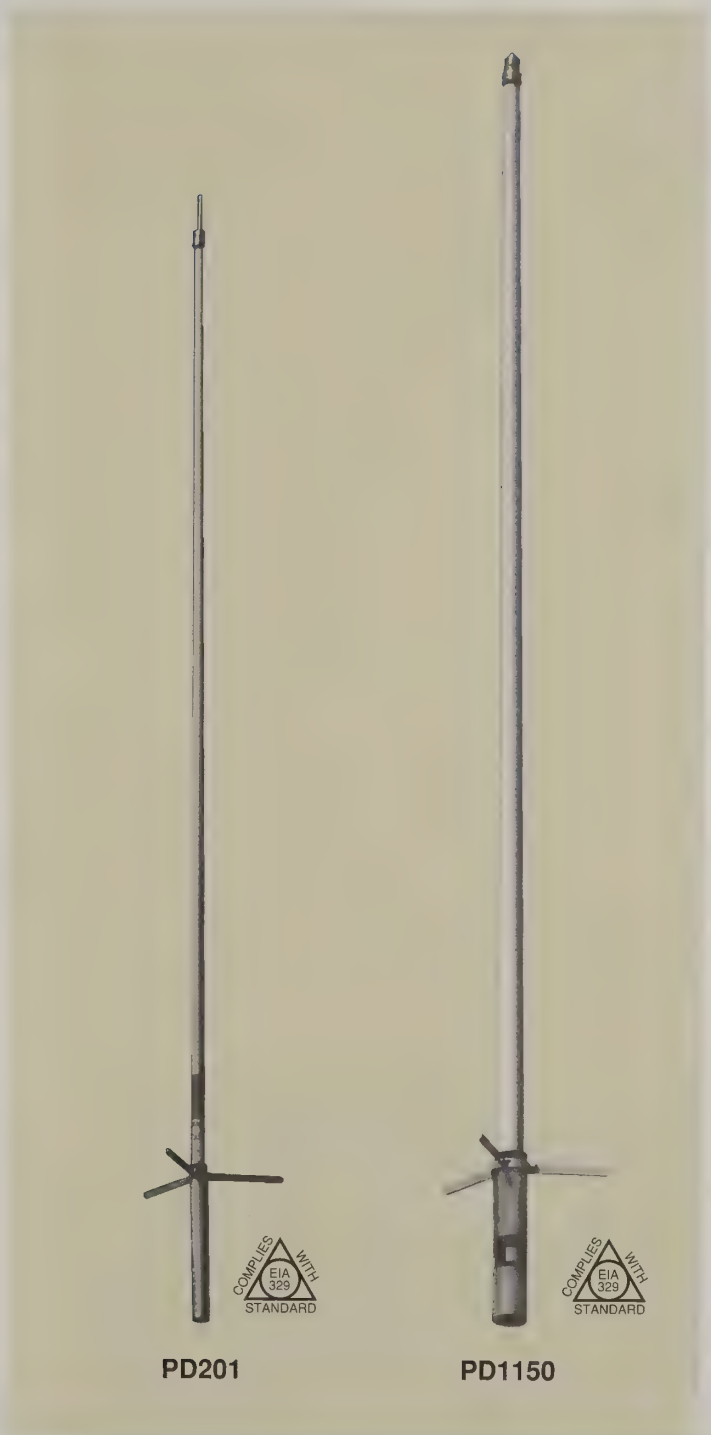
Fiberglass Collinear Antennas

PD201 5 dBd Stationmaster®
PD1150 5 dBd Super Stationmaster™

The PD201 Stationmaster Antenna is ideal for duplex or repeater systems where transmit and receive frequencies are separated by 10 MHz or less. The PD671 reflector assembly is available for the PD201. See page 67 on Special Radiation Patterns for details.

The PD1150 Super Stationmaster antenna also provides a full 10 MHz bandwidth preserving essentially the same characteristics as PD201, but with higher input power capability. The PD1009 reflector assembly is available for the PD1150.

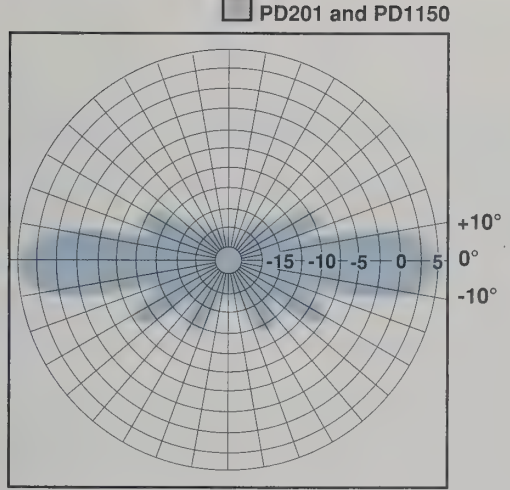
- **Fiberglass construction** — Protects radiating elements in corrosive environments.
- **DC grounded** — Affords lightning protection.
- **Copper radiating elements** — Minimizes possibility of intermod generation.



PD201 PD1150

VERTICAL PATTERN

PD201 and PD1150



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Fiberglass Collinear Antennas

ELECTRICAL SPECIFICATIONS	PD201	PD1150
Frequency Range - MHz	406-512	406-512
Gain - dBd	5	5
Bandwidth - MHz for 1.6:1 VSWR	10	10
Vertical Beamwidth 1/2 Power Points	18°	18°
Maximum Power Input - Watts	150	250
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Fixed	N-female	N-female
Flexible Extension - Supplied	18 in. (457 mm) RG8A/U Flexible Cable with N-male Connector Attached	

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD201	PD1150
Overall Length - ft. (m)	7.75 (2.36)	7.75 (2.36)
Element Housing Length - ft. (m)	6.67 (2.03)	6.67 (2.03)
Support Pipe Diameter - in. (mm)	1-5/16 (33)	2-3/8 (60)
Support Pipe Mounting Length - in. (mm)	12 (305)	12 (305)
Weight - lbs. (kg)	4 (1.81)	8 (3.64)
Radiating Element Material	Copper	Copper
Element Housing Material	Fiberglass	Fiberglass
Support Pipe Material	6061-T6 Aluminum	6061-T6 Aluminum
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	.375 (.035)	.675 (.063)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	15 (6.8)	27 (12.3)
Bending Moment 1 in. (25 mm) Below Ground Plane @ 100 mph - ft./lbs. (m/kg)	50 (6.9)	75 (10.4)
Mounting Hardware - Supplied	PD46 Clamp Set	PD46 Clamp Set
Mounting Hardware - Optional	PD241 Wall Mount PD246 Pole Mount PD402 Side Mount (Short) PD403 Side Mount (Long)	PD241 Wall Mount PD246 Pole Mount PD302 Side Mount (Short) PD303 Side Mount (Long)
Shipping Weight - lbs. (kg)	19 (8.62)	25 (11.34)
Shipping Volume - ft.^{3} (m^3)	0.7 (.02)	1.0 (.03)
Shipping Mode	450-512 MHz (UPS), 406-450 MHz (Common Carrier)	

Ordering Information

Item Number		Frequency Range - MHz
PD201-1	PD1150-1	406-413
PD201-2	PD1150-2	412-420
PD201-3	PD1150-3	420-430
PD201-4	PD1150-4	430-440
PD201-5	PD1150-5	440-450
PD201-6	PD1150-6	450-460
PD201-7	PD1150-7	460-470
PD201-8	PD1150-8	470-482
PD201-9	PD1150-9	482-494
PD201-10	PD1150-10	494-506
PD201-11	PD1150-11	500-512

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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Fiberglass Collinear Antennas

PD400 **7.5 dBd Stationmaster® Antenna**

PD1151 **8.0 dBd Super Stationmaster™ Antenna**

These fiberglass enclosed antennas offer significant advantages over most exposed element arrays and deliver equal or better electrical performance.

Super Stationmaster Antennas employ multiple, large diameter copper radiating elements stacked collinearly, fed in phase and enclosed in a weatherproof fiberglass housing. These DC grounded units use low loss Teflon® insulated connectors and their flexible extension cable is equipped with a weather shielded Type N male connector. The Super Stationmaster provides 8.0 dBd gain and a full 10 MHz bandwidth.

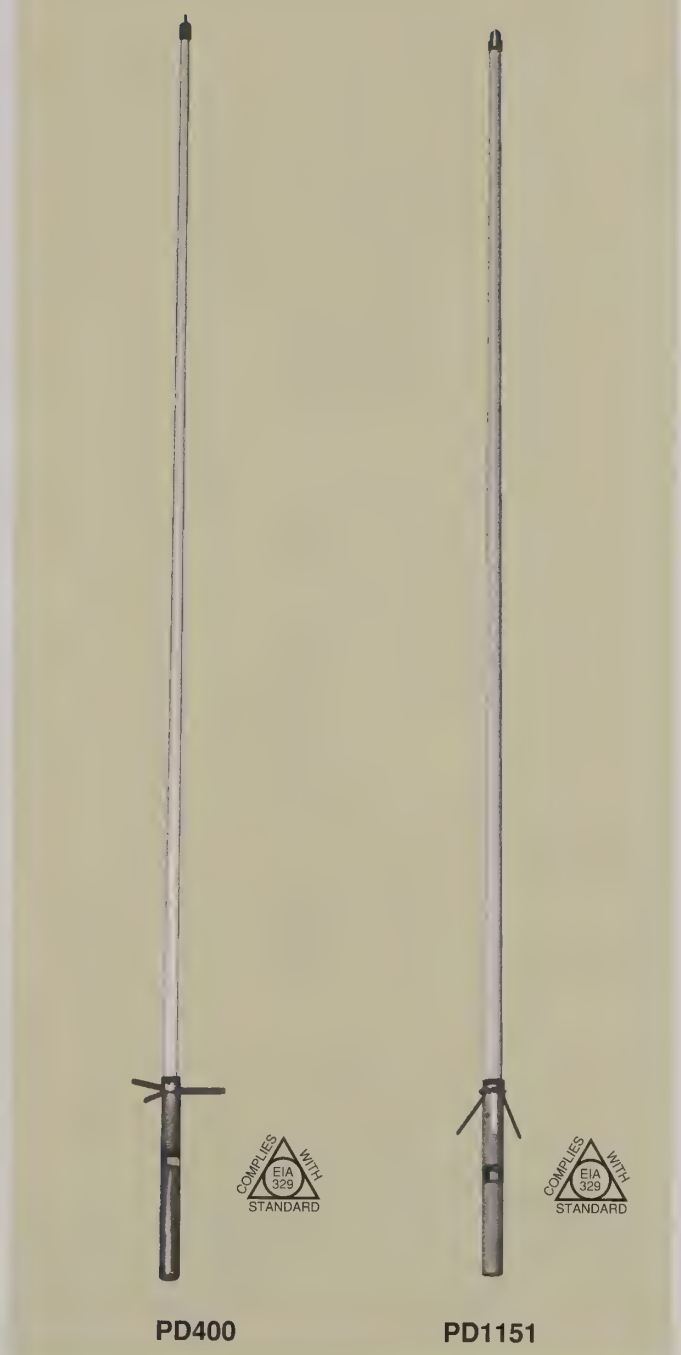
The Stationmaster provides 7.5 dBd omnidirectional gain and can withstand winds of 125 mph (200 km/hr). It is excellent for duplex systems with 8 MHz or less separation between Tx and Rx frequencies.

Several mounting hardware options and special reflector assembly kits are available for both these antennas. See page 67 for more information.

- **Weatherproof design** — Assures system reliability, withstands winds of 125 mph.
- **Copper elements** — Minimizes possibility of intermod generation.
- **DC grounded** — Protects against damage from lightning strikes.

Ordering Information

Item Number	Frequency Range - MHz	Item Number	Frequency Range - MHz
PD400-1	406-412	PD1151-1	406-420
PD400-1A	412-420	PD1151-2	440-450
PD400-1B	420-430	PD1151-3	450-460
PD400-1C	430-440	PD1151-4	460-470
PD400-2	440-450	PD1151-5	470-482
PD400-3	450-460	PD1151-6	482-494
PD400-4	460-470	PD1151-7	494-506
PD400-5	470-480	PD1151-8	500-512
PD400-6	480-490		
PD400-7	490-500		
PD400-8	500-512		



PD400 PD1151

Teflon® is a registered trademark of Du Pont.

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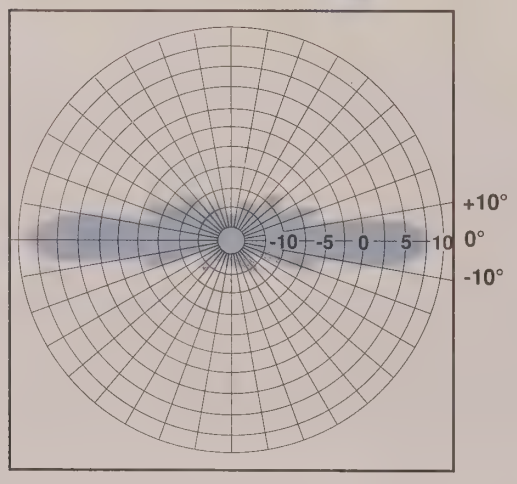
Fiberglass Collinear Antennas

ELECTRICAL SPECIFICATIONS	PD400	PD1151
Frequency Range - MHz	406-512	406-512
Gain - dBd	7.5	8.0
Bandwidth - MHz for 1.5:1 VSWR	8.0	10.0
Vertical Beamwidth 1/2 Power Point	12°	12°
Maximum Power Input - Watts	150	250
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Fixed	UHF-female	N-female
Flexible Extension - Supplied	18 in. (457 mm) RG8A/U Flexible Cable with N-male Connector Attached	

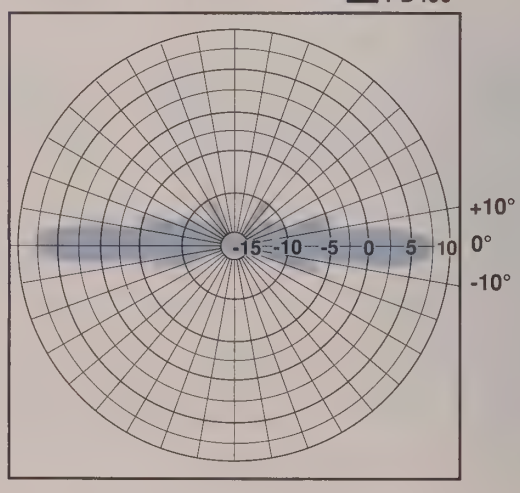
Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD400	PD1151
Overall Length - ft. (m)	13.2 (4.02)	17.2 (5.24)
Element Housing Length - ft. (m)	11 (3.35)	15 (4.57)
Support Pipe Diameter - in. (mm)	2-3/8 (60)	2-3/4 (70)
Support Pipe Mounting Length - in. (mm)	24 (610)	24 (610)
Weight - lbs. (kg)	17 (7.71)	20 (9.07)
Radiating Element Material	Copper	Copper
Element Housing Material	Fiberglass	Fiberglass
Support Pipe Material	6061-T6 Aluminum Pipe	6061-T6 Aluminum Pipe
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	.88 (.082)	1.17 (.109)
Rated Wind Velocity - mph (km/hr)	125 (201)	125 (201)
Lateral Thrust @ 100 mph - lbs. (kg)	35.5 (16)	46.8 (21.2)
Bending Moment 1 in. (25mm) Below Ground Plane @ 100 mph - ft./lbs. (m/kg)	192 (26.6)	236.8 (32.7)
Mounting Hardware - Supplied	PD46 Clamp Set	PD46 Clamp Set
Mounting Hardware - Optional	PD241 Wall Mount PD246 Pole Mount PD302 Side Mount (Short) PD303 Side Mount (Long)	PD241 Wall Mount PD246 Pole Mount PD556 Side Mount (Short) PD503 Side Mount (Long)
Shipping Weight - lbs. (kg)	37 (16.8)	45 (20.4)
Shipping Volume - ft.³ (m³)	1.8 (.051)	2.0 (.06)
Shipping Mode	Common Carrier	Common Carrier

VERTICAL PATTERN ☐ PD1151



VERTICAL PATTERN ☐ PD400



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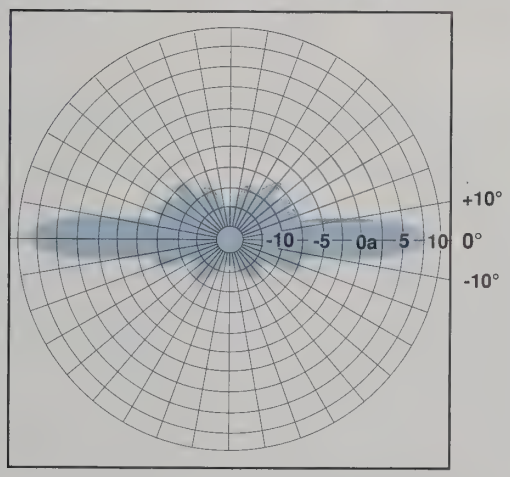
Fiberglass Broadband Antenna

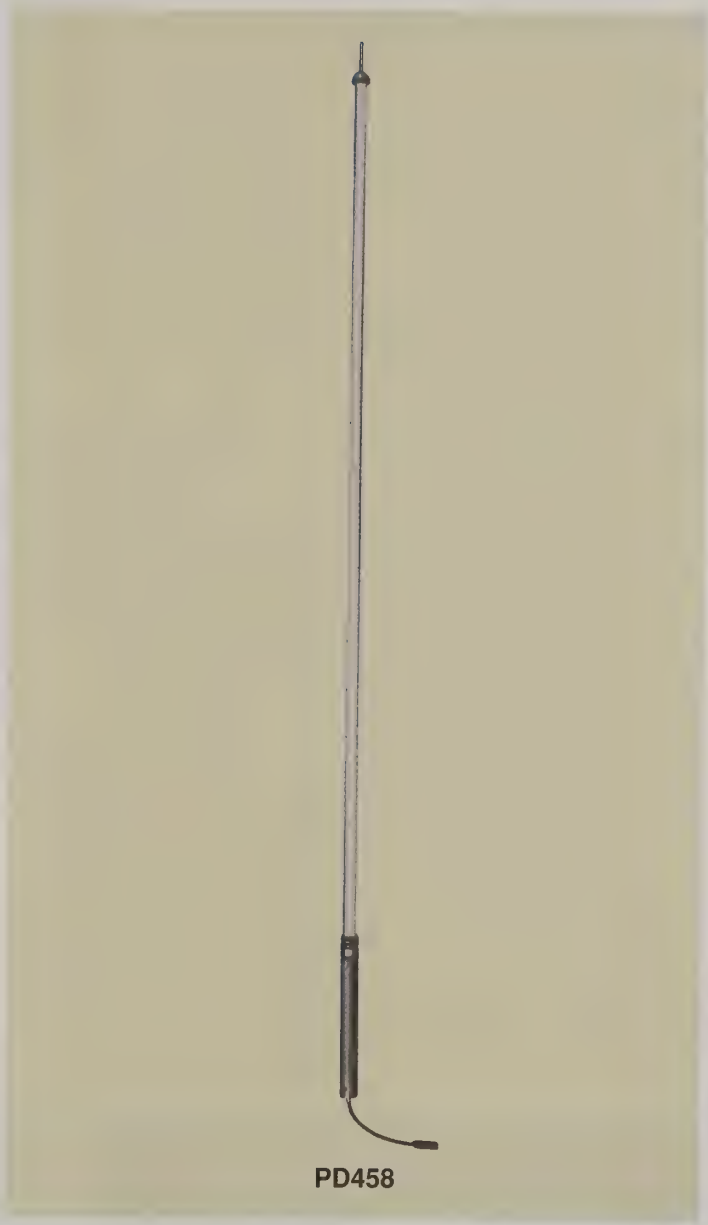
PD458 **8.0 dBd Storm Chief™ Ruggedized Broadband**

The PD458 is designed for use in areas where electrical storms are highly prevalent. An exposed lightning spike at the top of the antenna is directly connected to the support pipe by means of a 7/8 in. (22 mm) O.D. high conductivity copper conductor. In laboratory conditions, the PD458 has been directly subjected to 190 kiloamps without effect on performance. The radiating system of this antenna consists of six 1/2 wave elements mounted coaxially. The copper 7/8 in. (22 mm) diameter feed line shunt feeds each center grounded element. For a power rating of up to 1000 Watts this antenna can be modified with a fitting which will accept 7/8 in. (22 mm) diameter 50 Ohm cable directly. *Specify PD458K for the high power version. A reflector assembly is available. See page 67 for more information. Specify PD10000-2 for the 450-470 MHz models.*

- **Robust DC grounding** — Protects against damage from lightning strikes.
- **Broad bandwidth** — Fewer models to cover the band.
- **High power capability** — For multiple high power combined applications.

VERTICAL PATTERN ☐ PD458





PD458

Ordering Information

Item Number Standard	Item Number High Power	Frequency Range - MHz
PD458-1	PD458K-1	406-420
PD458-2	PD458K-2	450-470
PD458-3	PD458K-3	470-494
PD458-4	PD458K-4	488-512

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Fiberglass Broadband Antenna

ELECTRICAL SPECIFICATIONS	PD458			
Frequency Range - MHz	406-512			
Gain - dBd	8			
Standard Bandwidths - MHz	406-420	450-470	470-494	488-512
Bandwidth - MHz for 1.5:1 VSWR	14	20	24	24
Vertical Beamwidth 1/2 Power Points	12°	12°	12°	12°
Maximum Power Input - Watts	250 (PD458K: 1000 Watts)			
Lightning Protection	Direct Ground			
Termination - Direct Fixed	N-female (PD458K: 50 Ohms 7/8 in. (22 mm) EIA Flange)			
Flexible Extension - Supplied	18 in. (457mm) RG8A/U Flexible Cable w/N-male Connector Attached (PD458K, None)			

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD458			
Standard Bandwidths - MHz	406-420	450-470	470-494	488-512
Overall Length - ft. (m)	14.8 (4.51)	13.6 (4.15)	12.7 (3.87)	12.6 (3.84)
Element Housing Length - ft. (m)	12.5 (3.81)	11.3 (3.43)	10.4 (3.18)	10.3 (3.12)
Support Pipe Diameter - in. (mm)	2-3/4 (70)	2-3/4 (70)	2-3/4 (70)	2-3/4 (70)
Support Pipe Mounting Length - in. (mm)	24 (610)	24 (610)	24 (610)	24 (610)
Weight - lbs. (kg)	24 (10.9)	22 (10.0)	21 (9.55)	21 (9.55)
Radiating Element Material	2 in. (50.8 mm) Diameter Brass Tube			
Element Housing Material	2-3/8 in. (60.3 mm) Diameter Fiberglass Radome			
Support Pipe Material	6061-T6 Aluminum Pipe			
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	2.55 (.237)	2.25 (.209)	2.13 (.198)	2.05 (.191)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	102 (46.4)	90 (40.9)	85 (38.6)	82 (37.3)
Bending Moment 1 in. (25 mm) Below Top of Support Pipe @ 100 mph - ft./lbs. (m/kg)	590 (82)	450 (62)	400 (55)	380 (53)
Mounting Hardware - Supplied	PD46 Clamp Set			
Mounting Hardware - Optional	PD241 Wall Mount PD246 Pole Mount	PD10024 Side Mount (Short) PD10028 Side Mount (Long)		
Shipping Weight - lbs. (kg)	48 (21.8)	46 (20.9)	45 (20.4)	45 (20.4)
Shipping Volume - ft.^{3} (m^3)	2.8 (.08)	2.75 (.077)	2.65 (.075)	2.6 (.073)
Shipping Mode	Common Carrier			

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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Fiberglass Collinear Antennas

PD455 **10 dBd Super Stationmaster™**

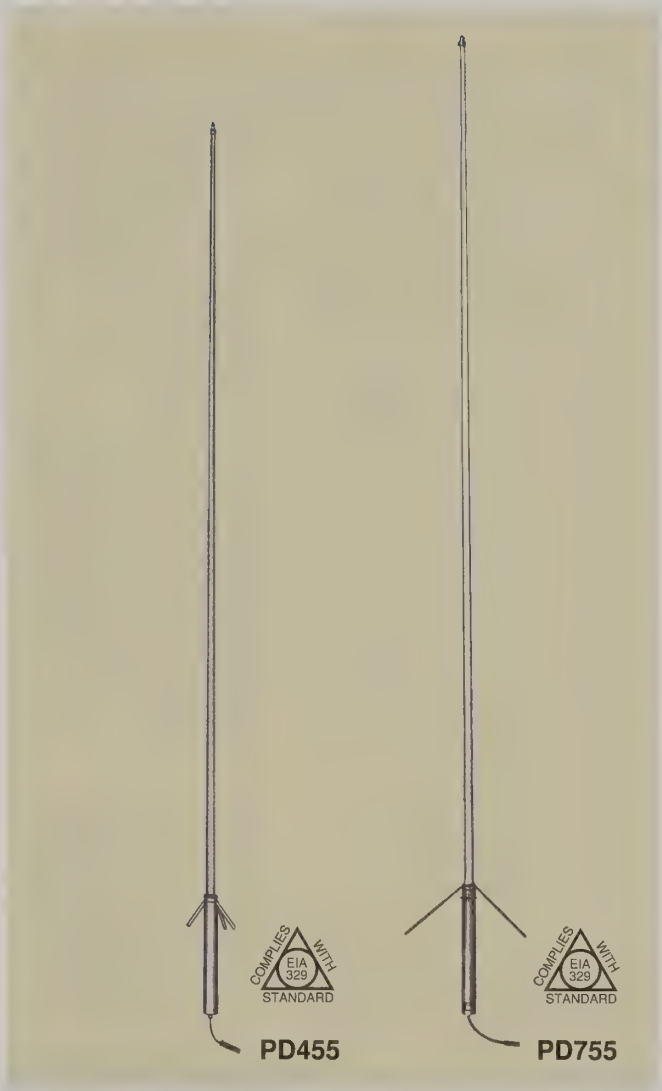
PD755 **10 dBd Heavy Duty Super Stationmaster™**

These Super Stationmaster UHF base station antennas incorporate design enhancements not normally available in other fiberglass collinear antennas of comparable size. Due to their broadband characteristics, only six versions are required to cover the 450-512 MHz band.

The PD455 combines full 10 MHz bandwidth capability and improved lightning protection with 10 dBd omni-directional gain while preserving the desirable light-weight characteristic found in all Stationmaster antennas. The PD755 is electrically equivalent to the PD455 but represents an extra rugged version with specially strengthened housing and support pipe. It is designed for use in very severe weather environments. The PD568 reflector assembly is available for the PD455. See page 67 on Special Radiation Patterns for details.

The PD455DT and PD755DT may be ordered with either 3° or 6° downtilt. Note: Operational gain and bandwidth are lessened with downtilt to 9.5 dBd and 8 MHz bandwidth.

- **Fiberglass construction** — Protects radiating elements in corrosive environments.
- **Copper radiating elements** — Minimizes possibility of intermod generation.
- **Full 10 dB gain** — Provides maximum on horizon coverage.



Ordering Information (Specify DT for Downtilt Option)

Item Number	Frequency Range - MHz	Item Number	Frequency Range - MHz
PD455-1	406-413	PD755-1	406-413
PD455-2	412-420	PD755-2	412-420
PD455-3	420-430	PD755-3	420-430
PD455-4	430-440	PD755-4	430-440
PD455-5	440-450	PD755-5	440-450
PD455-6	450-460	PD755-6	450-460
PD455-7	460-470	PD755-7	460-470
PD455-8	470-482	PD755-8	470-482
PD455-9	480-490	PD755-9	482-494
PD455-10	494-506	PD755-10	494-506
PD455-11	500-512	PD755-11	500-512

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Fiberglass Collinear Antennas

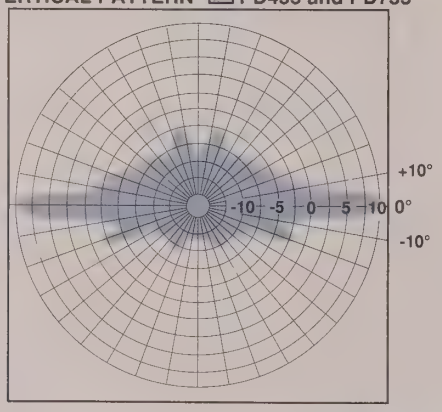
ELECTRICAL SPECIFICATIONS	PD455	PD455DT	PD755	PD755DT
Frequency Range - MHz	406-512	406-512	406-512	406-512
Gain - dBd	10	9.5	10	9.5
Bandwidth - MHz for 1.5:1 VSWR	10	8	10	8
Vertical Beamwidth 1/2 Power Points	7°	7°	7°	7°
Maximum Power Input - Watts	250	250	250	250
Lightning Protection	Direct Ground	Direct Ground	Direct Ground	Direct Ground
Termination - Direct Fixed	N-female	N-female	N-female	N-female
Flexible Extension - Supplied	18 in. (457mm) RG8A/U Flexible Cable with N-male Connector Attached			

Note: All VSWR data referenced to 50 Ohms.

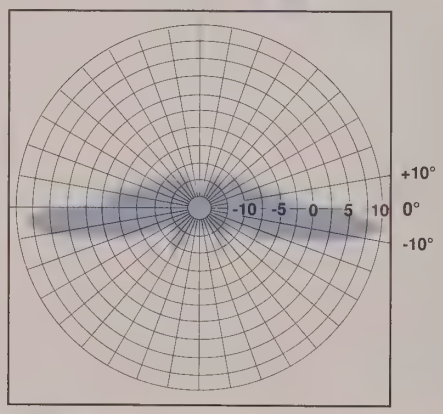
MECHANICAL SPECIFICATIONS	PD455	PD455DT	PD755	PD755DT
Overall Length - ft. (m)	22 (6.71)	22 (6.71)	23 (7.01)	23 (7.01)
Element Housing Length - ft. (m)	20 (6.10)	20 (6.10)	20 (6.10)	20 (6.10)
Support Pipe Diameter - in. (mm)	2-3/4 (69.8)	2-3/4 (69.8)	3-1/2 (88.9)	3-1/2 (88.9)
Support Pipe Mounting Length - in. (mm)	24 (610)	24 (610)	34 (864)	34 (864)
Weight - lbs. (kg)	23 (10.4)	23 (10.4)	53 (24.0)	53 (24.0)
Radiating Element Material	Copper	Copper	Copper	Copper
Element Housing Material	Fiberglass	Fiberglass	Fiberglass	Fiberglass
Support Pipe Material	6061-T Aluminum Pipe	6061-T Aluminum Pipe	6061-T Aluminum Pipe	6061-T Aluminum Pipe
Wind Loading Area Flat Plate Equivalent - ft.² (m^2)	1.98 (.184)	1.98 (.184)	2.37 (.220)	2.37 (.220)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)	175 (282)	175 (282)
Rated Wind Velocity with 1/2 in. (13mm) of Radial Ice - mph (km/hr)	85 (137)	85 (137)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	79 (35.9)	79 (35.9)	94.8 (43)	94.8 (43)
Bending Moment 1 in. (25mm) Below Ground Plane @ 100 mph (161 km/hr) with No Ice - ft./lbs. (m/kg)	521 (72)	521 (72)	850 (118)	850 (118)
Mounting Hardware - Supplied	PD46 Clamp Set	PD46 Clamp Set	PD346 Heavy Duty Clamp Set	PD346 Heavy Duty Clamp Set
Mounting Hardware - Optional	PD241 Wall Mount, PD246 Pole Mount PD556 Side Mount (Short), PD503 Side Mount (Long)		PD561 Side Mount (Long) Note: Recommend using PD455 when side mounting	
Shipping Weight - lbs. (kg)	58 (26.3)	58 (26.3)	106 (48.1)	106 (48.1)
Shipping Volume - ft.³ (m^3)*	2.7 (.08)	2.7 (.08)	5.6 (.16)	5.6 (.16)
Shipping Mode	Common Carrier	Common Carrier	Common Carrier	Common Carrier

***Note:** The maximum overall length of the shipping container is 24 ft. (7.3 meters).

VERTICAL PATTERN ☐ PD455 and PD755



VERTICAL PATTERN ☐ PD455DT



CELWAVE®
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Special Radiation Patterns for VHF and UHF

Stationmaster® & Super Stationmaster™ Series Antennas

The design of this antenna series readily lends itself to use in special radiation pattern applications. Radiation power can be redirected to create additional gain areas or a quiet zone area through the use of a reflector assembly, by side mounting, or by phasing two antennas.

Omnidirectional antennas will exhibit a directional pattern when side mounted (Figure 1). Two top mounted antennas when fed in-phase can also be used to provide a bi-directional pattern (Figure 2).

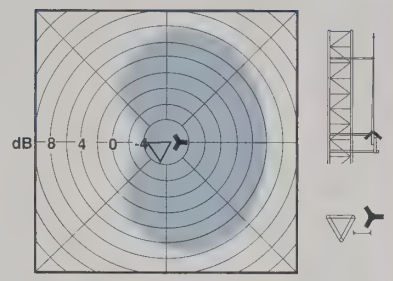
Figure 3 illustrates the narrow, high gain pattern of a side mounted PD220 antenna with PD555 reflector assembly. Figure 4 demonstrates a wide directional pattern of a top mounted antenna with reflector assembly.

We can calculate patterns for specific mounting configurations and antenna product. Contact our Customer Service Department with your particular mounting constraints and pattern needs.

TABLE OF REFLECTOR ASSEMBLIES

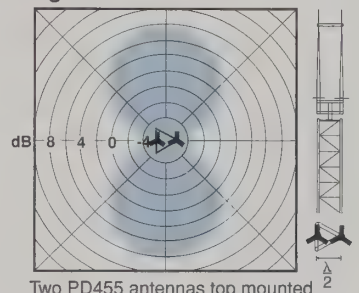
Celwave Antenna PD Number	Reflector Assemblies
PD200	PD1001
PD201	PD671
PD220	PD555
PD400	PD568
PD455	PD568
PD458-2	PD10000
PD755	PD10049
PD1151	PD1007
PD1150	PD1009

Figure 1



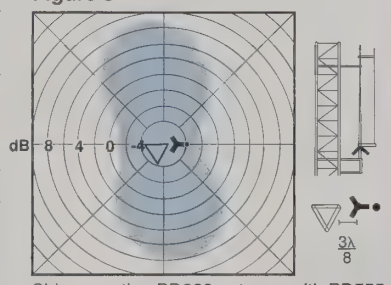
Side-mounted PD220 antenna shown on an 18 inch tower for 180° sector coverage.

Figure 2



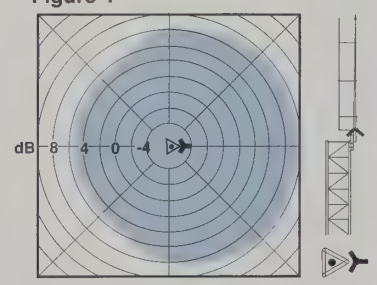
Two PD455 antennas top mounted and fed in phase provide bi-directional coverage.

Figure 3

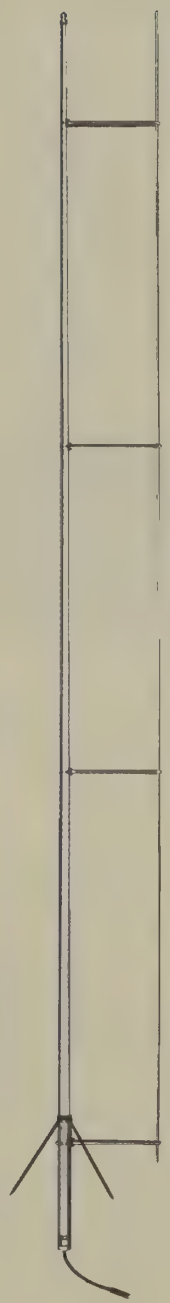


Side-mounting PD220 antenna with PD555 Reflector assembly as shown on an 18 inch tower face for broadside coverage.

Figure 4



Top-mounted PD455 antenna with PD568 Reflector assembly to provide a 5 dBd front-to-back ratio.



PD555 Reflector Assembly

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Single and Dual Yagi Antennas

PD688S **10 dBd Gain, 7 Element Single Yagi**

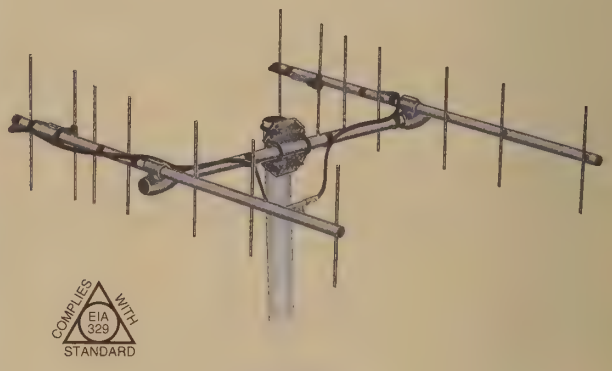
PD688D **13 dBd Gain, 14 Element Dual Yagi**

These Yagi Antennas are constructed using 6061-T6 aluminum rod and pipe. Solid director and solid reflector elements are precision welded to their main boom effectively eliminating misalignment problems during shipping, installation or in service. Provision has been made in the mounting hardware for either vertical or horizontal polarization and stacking.

Ordering Information

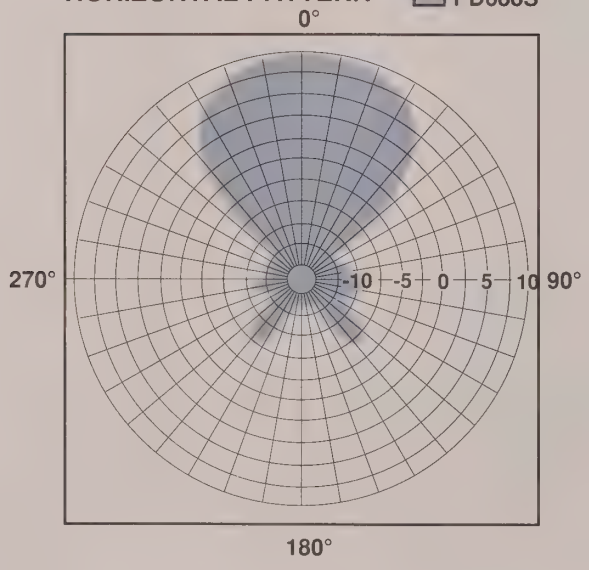
Item Number		Freq. Range - MHz
PD688S-1	PD688D-1	406-420
PD688S-2	PD688D-2	420-440
PD688S-3	PD688D-3	450-470
PD688S-4	PD688D-4	470-494
PD688S-5	PD688D-5	494-512

PD688S

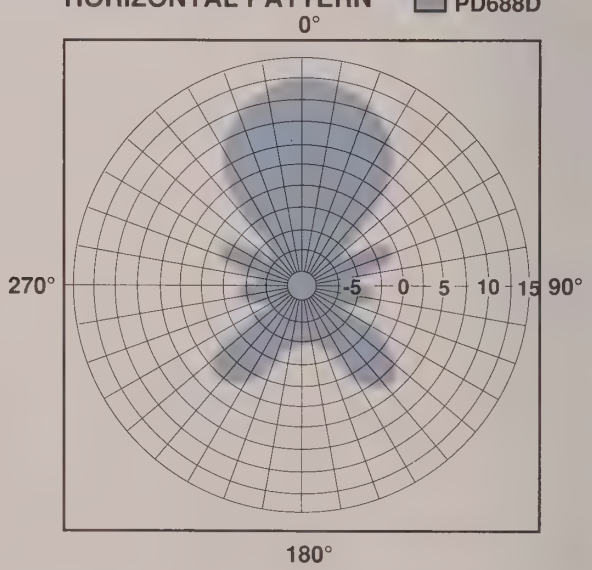


PD688D

HORIZONTAL PATTERN ☐ PD688S



HORIZONTAL PATTERN ☐ PD688D



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Single and Dual Yagi Antennas

ELECTRICAL SPECIFICATIONS	PD688S	PD688D
Frequency Range - MHz	406-512	406-512
Gain - dBd	10	13
Bandwidth - MHz for 1.5:1 VSWR	20	20
Horizontal Beamwidth 1/2 Power Points	50°	24°
Vertical Beamwidth 1/2 Power Points	40°	40°
Maximum Power Input - Watts	250	250
Front-To-Back Ratio - dBd	15 (min.)	15 (min.)
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Flexible	18 in. (457 mm) RG8A/U Fexible Cable with N-male Connector Attached	

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD688S	PD688D
Maximum Element Length - in. (mm) @ 450 MHz	13.4 (340)	13.4 (340)
Element Support Length - in. (mm) @ 450 MHz	50 (1270)	43.5 (1105)
Antenna Separation - in. (mm)	N/A	33 (838)
Weight - lbs. (kg)	3.75 (1.70)	8 (3.64)
Element Material	3/8 in. (10 mm) Diameter 6061-T6 Aluminum Rod	
Element Support Material	1-1/16 in. (27 mm) Diameter 6061-T6 Aluminum Pipe	
Wind Loading Area Flat Plate Equivalent - $ft.^2(m^2)$	0.35 (.033)	0.75 (.070)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	14 (6.4)	30 (13.6)
Torsional Moment @ 100 mph with Standard Mounting - ft./lbs. (m/kg)	24.5 (3.4)	N/A
Mounting Hardware - Supplied	U Bolts 5/16 in. (8 mm) ID	PD237 Crossover Plate
Shipping Weight - lbs. (kg)	8 (3.63)	18 (8.16)
Shipping Volume - $ft.^3$ (m^3)	3.2 (.1)	6.2 (.2)
Shipping Mode	UPS	UPS

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

Panel Directional Antennas

PD10054 **7.3 dBd Gain**
PD10055 **10.0 dBd Gain**

These single and dual panel directional antennas are designed to eliminate many problems inherent with side mounted exposed dipole antennas.

These antennas feature high front-to-back ratio making them nearly impervious to tower changes that would alter the pattern of the antenna. They are not phase critical with tower members. They can be positioned where they mechanically fit and mounted back-to-back to provide dual system coverage from the same tower with only 30% more windloading.

In addition, these units are less subject to damage from low amplitude and proximity lightning strikes, can be used in any climate and withstand icing, salt air and acid rain.

- **Weather resistant radome** — Withstands icing, salt air and acid rain.
- **High front-to-back ratio** — Provides isolation from adjacent systems.
- **Shielded element** — Protects against damage from low amplitude and proximity lightning strikes.
- **Low profile** — Aesthetically pleasing, can be painted to blend with architecture.*
- **Pattern flexability** — Can be arrayed for gain or quiet zone.

*Contact Sales Engineering for painting instructions.

PD10054

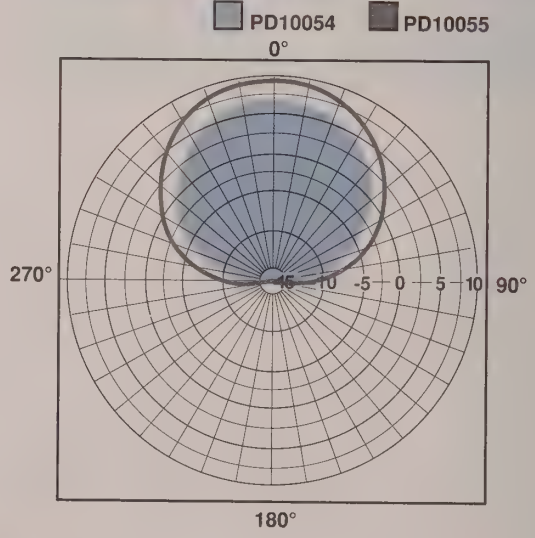
COMPLIES WITH EIA 329 STANDARD

Patents Pending

Ordering Information

Item Number		Freq. Range - MHz
PD10054-1	PD10055-1	400-440
PD10054-2	PD10055-2	420-460
PD10054-3	PD10055-3	440-480
PD10054-4	PD10055-4	460-500
PD10054-5	PD10055-5	480-520

HORIZONTAL PATTERN



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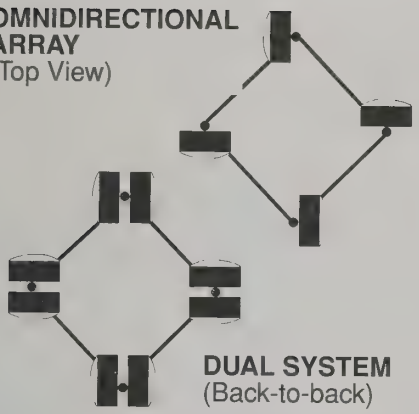
Panel Directional Antennas

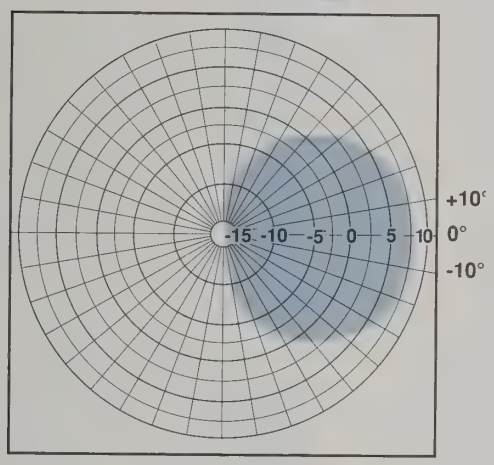
OMNIDIRECTIONAL ARRAY
(Top View)



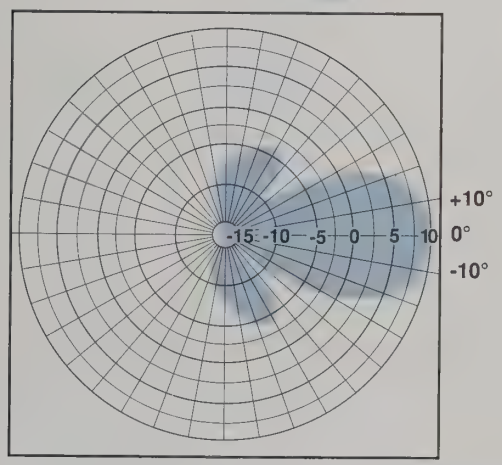
DUAL SYSTEM
(Back-to-back)

Note: The arrray gain is not neccesarily the gain of the antenna.

VERTICAL PATTERN ☐ PD10054



VERTICAL PATTERN ☐ PD10055



ELECTRICAL SPECIFICATIONS	PD10054	PD10055
Frequency Range - MHz	400-520	400-520
Gain - dBd	7.3	10.0
Bandwidth - MHz for 1.5:1 VSWR	40	40
Horizontal Beamwidth 1/2 Power Points	65°	65°
Vertical Beamwidth 1/2 Power Points	65°	35°
Maximum Power Input - Watts	250	250
Front-to-Back Ratio - dBd	25 (30 Typical)	
Lightning Protection	Direct Ground	
Termination - Direct Fixed	N-female	

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD10054	PD10055
Width - in. (mm)	20-1/8 (511)	20-1/8 (511)
Height - in. (mm)	20-1/8 (511)	40 (1015)
Depth - in. (mm)	9-7/8 (251)	9-7/8 (251)
Weight - lbs. (kg)	18 (8.16)	28 (12.7)
Radiating Element Material	Copper Alloy	
Radome Material	Weather Resistant Plastic	
Reflector Material	5052-H32 Aluminum	
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	2.81 (.26)	5.6 (.52)
Rated Wind Velocity - mph (km/hr)	100 (161)	
Lateral Thrust @ 100 mph - lbs. (kg)	112 (51)	224 (102)
Torsional Moment @ 100 mph with Std. Mounting - ft. lbs. (m/kg)	34.5 (4.8)	68.6 (9.5)
Mounting Hardware - Supplied	PD10238	
Shipping Weight - lbs. (kg)	40 (18.1)	60 (27.2)
Shipping Volume - ft.^{3} (m^3)	7.0 (.19)	12.5 (.35)
Shipping Mode	UPS	Common Carrier or UPS

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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The Penetrator™ Antennas

The Penetrator series are patented antennas for use in UHF Wideband, Mobile, Cellular and Paging applications. These antennas are designed to deliver high gain with heavy null fill and electrical beamtilit which provides blanket coverage, and reduced interference from adjacent systems.

They are available in omni or directional models providing up to 12 dBd and 16.3 dBd gain respectively and can operate over a bandwidth up to 100 MHz. A beamtilt of 0.75 degrees is standard in most models. Various other required beamtilts are available at no additional cost. Special high power options of 1000 and 3000 Watts of input power are also available.

Adapted from TV/FM Broadcasting, the design of the Penetrator Series feature an array of side fed dipoles with a multiple feed system to maximize the pattern and impedence.

- **High gain** — Maximizes ERP.
- **Heavy null fill** — Enhances close-in coverage.
- **Customized beamtilt** — Minimizes interference to and from adjacent systems.
- **Various patterns available** — Efficiently cover target area.

Option J - This option allows the electrical beamtilt to be adjusted in the field with the use of J-cables.

Note: Large beamtilts usually cause significant loss of antenna gain.

Option L - This option allows larger degrees of electrical beamtilt to be used without loss of antenna gain.

See these pages for your specific applications:
UHF Wideband 75-76
Mobile, Cellular, Paging
Single Models 77-80
Dual Models 83-86
Multiple Service.....81-82

Penetrator

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The Penetrator™ Antennas

MOUNTING BRACKETS:

B1	B1 bracket for standard mounting
B1HD	B1 bracket for heavy duty
B1AG	B1 bracket for AGR models
B2	B2 bracket (mounted on side of radome) standard
B2HD	B2 bracket (mounted on side of radome) for heavy duty

PENETRATOR OPTIONS:

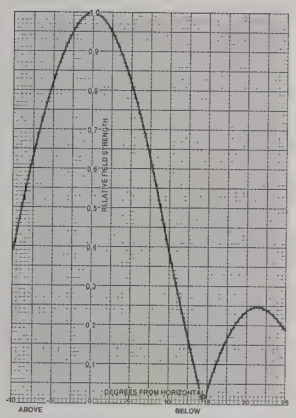
Option L	L
Option J	J
EIA Connector	E
LC Connector	C
7/16 Connector	S
Option I (Inverted)	I
Option HW (Higher wind rated)	W
Option HP 1000 Watts	K
Option HP 3000 Watts	3K

Ordering information:
To Order, Specify the Following;
1. Frequency- Model (AGR, ALR, AHR, BMR, BCR, BPR, BMS)
2. Gain- Use omnidirectional gain (6, 8, 9, 10, 12)
3. Options- (See option list)
4. Pattern- A,B,D,H or O
5. Mounting Bracket- B1 or B2
6. Specify beamtilt.

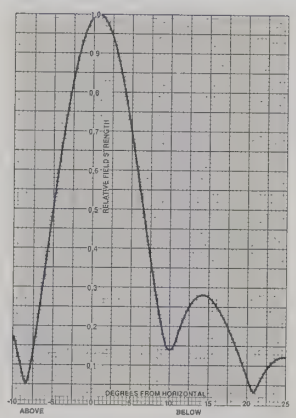
Example: B( )R8C-A-B1

Frequency Gain Options Pattern Mounting Bracket

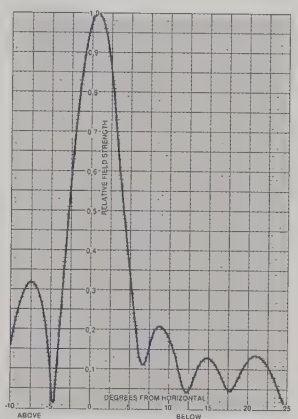
VERTICAL PATTERNS



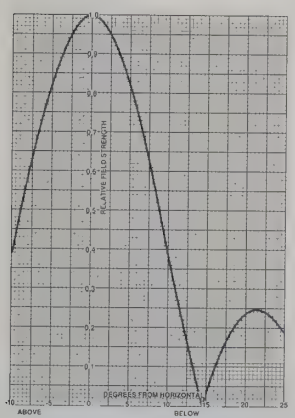
VERTICAL PATTERN
A( )R6
Beam Tilt - 0.0°
Gain (Main Lobe) - 6.0 dB



VERTICAL PATTERN
A( )R8
Beam Tilt - 0.75°
Gain (Main Lobe) - 8.0 dB

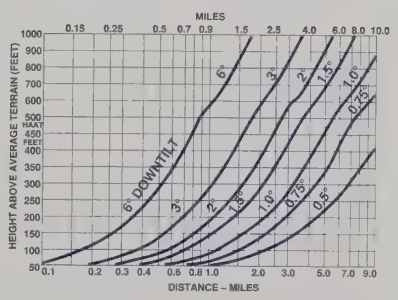


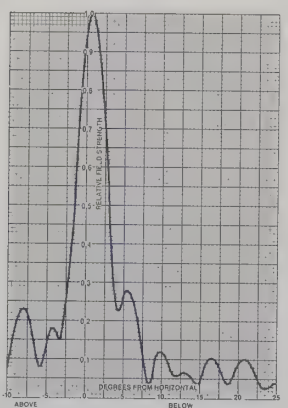
VERTICAL PATTERN
A( )R10
Beam Tilt - 0.75°
Gain (Main Lobe) - 10.0 dB



VERTICAL PATTERN
B( )R6
Beam Tilt - 0.0°
Gain (Main Lobe) - 6.0 dB

DOWNTILT vs. ANTENNA HEIGHT & DISTANCE





VERTICAL PATTERN
B( )R12
Beam Tilt - 0.75°
Gain (Main Lobe) - 12.0 dB

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The Penetrator™ Antennas

TYPICAL MOUNTING CONFIGURATIONS

1. FLANGE TOP MOUNT
Mount directly to tower top with eight 3/4" diameter bolts on a 9-1/2" bolt circle. (B1 Bracket).

2. TOWER LEG TOP MOUNT
Mount directly to tower leg 2-1/2" to 4" in diameter with antenna above top of tower.(B2 Bracket).

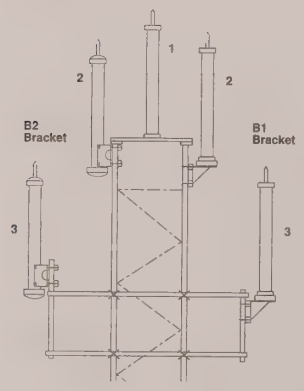
3. VERTICAL POLE SIDE MOUNTS*
Mount to 2-1/2" to 4"diameter pole.(B2 Bracket).

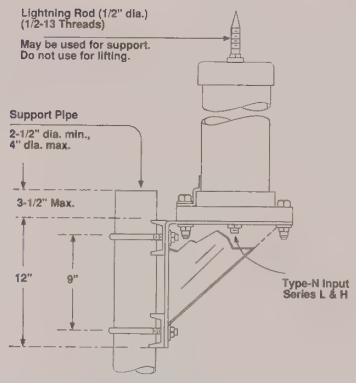
4. 800 MHz MODELS
When side mounting this series, a minimum of four feet from any metal is required.

5. 400 MHz MODELS
When side mounting this series, a minimum of six feet from any metal is required.

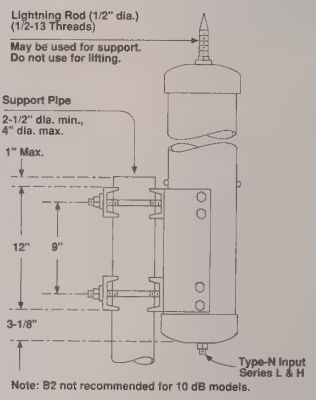
**Side mounting assemblies are not available from Celwave, contact customer service for details.*

TYPICAL MOUNTING FOR 400-500 MHz MODELS



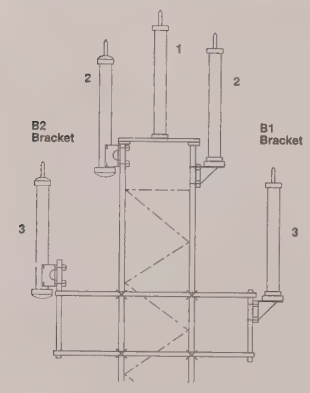


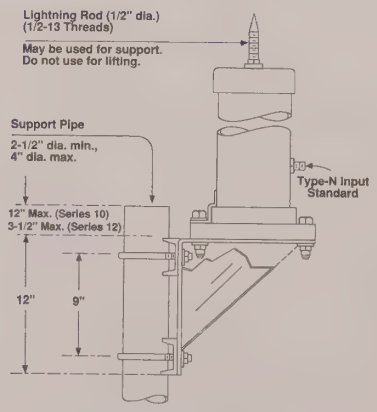
B1 MOUNTING BRACKET



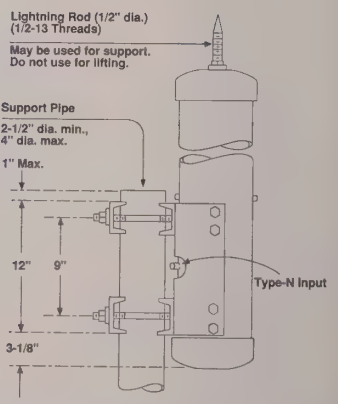
B2 MOUNTING BRACKET

TYPICAL MOUNTING FOR 800 MHz MODELS





B1 MOUNTING BRACKET



B2 MOUNTING BRACKET

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Penetrator™ - For UHF Wideband Applications

AGR9*, AGR8*, AGR6*

*** Pattern desired (O, A, B) must be specified after model number.**
U.S. Patent 4,518,969

These units enable operators to cover the complete business band with a single antenna. They deliver 6, 8 or 9 dBd omnidirectional gain over a bandwidth up to 14 MHz. All feature constant beam tilt, directional horizontal pattern and have been VSWR tested.

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS	AGR SERIES PENETRATOR
Design Frequency Band - MHz	406-420 (14 MHz Bandwidth)
Polarization	Vertical
Null Fill 8 dB	Uniform Signal Strength on Ground From Antenna Site to Horizon.
6 dB, 9 dB	None (standard)
Beam Tilt - 9 dB, 8 dB, 6 SP (Standard) 6 dB	-3/4° None
Input VSWR	1.5:1 Maximum
Input Connector	N-female 50 Ohms
Max. Input Power-Watts	500
Lightning Protection	Top Rod Grounded to Base Mount

MECHANICAL SPECIFICATIONS	9 dB	8 dB	6 dB
Length - ft. (m)	20 (6.1)	14 (4.3)	10.7 (3.3)
Radome Diameter - in. (mm)	8-5/8 (218.9)	8-5/8 (218.9)	8-5/8 (218.9)
Weight - lbs. (kg)			
A and B Pattern	97 (44)	73 (33)	57 (26)
– With B1 Bracket	148 (67)	124 (56)	108 (49)
– With Add'l Mtg. Hardware	173 (78)	149 (67)	133 (60)
O Pattern	107 (48)	81 (36)	62 (28)
– With B1 Bracket	158 (71)	132 (59)	113 (51)
– With Add'l Mtg. Hardware	183 (82)	157 (71)	138 (62)
Survival Wind Force - psf (100 mph)			
A and B Pattern	50	50	50
O Pattern	50	50	50
Max. Wind Shear - lbs. (100 mph)			
A and B Pattern	480	337	257
O Pattern	503	357	270
Wind Loading Area - ft.² (m²)			
A and B Pattern	14.4(1.34)	10.1(.94)	7.7(.72)
O Pattern	15.1(1.40)	10.7(.99)	8.1(.75)
Mounting	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount		
Materials	Aluminum and Fiberglass		

OPTIONS AVAILABLE

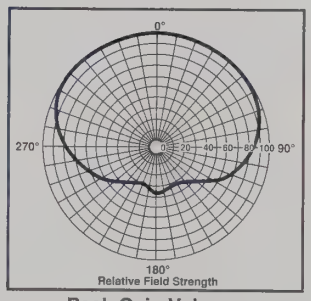
- Power handling to 3000 Watts.
- Other electrical beam tilt values.
- Beam tilt adjustable by user with option J.
- Higher wind survival.
- Multiple antennas in one radome.
- Other operating bands available.

WHEN ORDERING:
Provide downtilt when non-standard or ordering OPTION-J, OPTION-L, or J-CABLES.

PATTERN AND GAIN SPECIFICATIONS

Gain shown is the peak value over the operating bandwidth.

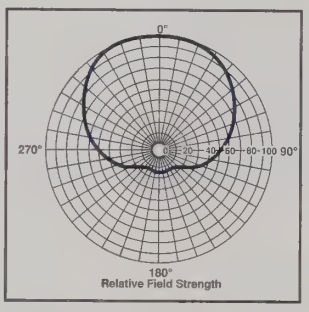
PATTERN A
220° COVERAGE



Peak Gain Values

Model	Gain (dBd)
AGR9A	11.3 dB
AGR8A	10.3 dB
AGR6A	8.3 dB

PATTERN B
140° COVERAGE



Peak Gain Values

Model	Gain (dBd)
AGR9B	13.0 dB
AGR8B	12.0 dB
AGR6B	10.0 dB

PATTERN O
360° COVERAGE

(Omnidirectional ± 1.5 dB Maximum)

Average Gain Values

Model	Gain (dBd)
AGR9	9.0 dB
AGR8	8.0 dB
AGR6	6.0 dB

To Order, Specify:

1. Frequency - Model - AGR
2. Gain - 6, 8 or 9 dB
3. Options
4. Pattern - O, A or B
5. Mounting Bracket - B1 or B2
6. Beamtilt

Example: AGR9-A-B1AG

Penetrator™ - For UHF Wideband Applications

ALR10*, ALR8*, ALR6* 450-482 MHz
AHR10*, AHR8*, AHR6* 470-512 MHz

*** Pattern desired (O, A, B, D) must be specified after model number.**
U.S. Patent 4,518,969

Enabling operators to cover the complete business band with one antenna, these units deliver 6, 8, or 10 dBd over a bandwidth up to 42 MHz. The 8 dB and 10 dB gain models feature constant beam tilt, heavy null fill, omnidirectional or directional horizontal pattern and have been VSWR tested.

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Design Frequency Band - MHz	
Model ALR	450-482 (32 MHz Bandwidth)
Model AHR	470-512(42 MHz Bandwidth)
Polarization	Vertical
Null Fill 10 dB, 8 dB	Uniform Signal Strength on Ground From Antenna Site to Horizon
6 dB	None (standard)
Beam Tilt - 10 dB, 8 dB, 6SP	-3/4°
(Standard) 6 dB	None
Input VSWR	1.5:1 Maximum
Input Connector	N-female 50 Ohms
Max. Input Power - Watts	500
Lightning Protection	Top Rod Grounded to Base Mount

MECHANICAL SPECIFICATIONS

Length - ft. (m) – 10 dB	20 (6.1) Plus Lightning Rod
– 8 dB	12 (4.18) Plus Lightning Rod
– 6 dB	8 (2.44) Plus Lightning Rod
Diameter - in. (mm)	6-5/8 (168.3)
Weight - lbs. (kg)	
10 dB	92 (41.4) Flanged
– With B1 Bracket	124 (55.8)
– With B2 Bracket (100 mph)	108 (48.6)
8 dB	52 (23.4) Flanged
– With B1 Bracket	84 (37.8)
– With B2 Bracket	68 (30.6)
6 dB	36 (16.2) Flanged
– With B1 Bracket	68 (30.6)
– With B2 Bracket	52 (23.4)
Survival Wind Force - psf (100 mph)	40
Max. Wind Shear - lbs. (100 mph)	
– 10 dB	304
– 8 dB	180
– 6 dB	120
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	
– Series 10	7.6 (.706)
– Series 8	4.5 (.418)
– Series 6	3.0 (.278)
Mounting	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount
Materials	Aluminum and Fiberglass (Blue Standard)

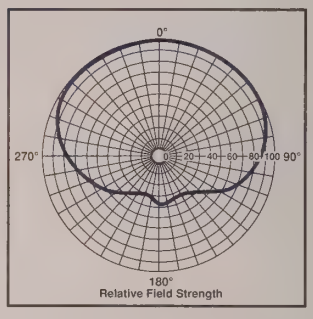
OPTIONS AVAILABLE

- Power handling to 3000 Watts.
- Other electrical beam tilt values.
- Beam tilt adjustable by user with option J.
- Higher wind survival.
- Multiple antennas in one radome.
- Other operating bands available.

PATTERN AND GAIN SPECIFICATIONS

Gain shown is the peak value over the operating bandwidth.

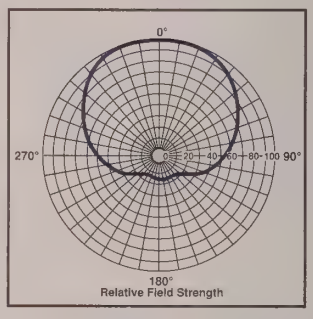
PATTERN A
220° COVERAGE



Peak Gain Values

Model	Gain (dBd)
ALR10A, AHR10A	12.3 dB
ALR8A, AHR8A	10.3 dB
ALR6A, AHR6A	8.3 dB

PATTERN B
140° COVERAGE



Peak Gain Values

Model	Gain (dBd)
ALR10B, AHR10B	14.0 dB
ALR8B, AHR8B	12.0 dB
ALR6B, AHR6B	10.0 dB

PATTERN O
360° COVERAGE
(Omnidirectional ± 1.5 dB Maximum)

Average Gain Values

Model	Gain (dBd)
ALR10, AHR10	10.0 dB
ALR8, AHR8	8.0 dB
ALR6, AHR6	6.0 dB

To Order, Specify:

1. Frequency - Model - ALR or AHR
2. Gain - 6, 8 or 10 dB
3. Options
4. Pattern - O, A or B
5. Mounting Bracket - B1 or B2
6. Beamtilt

Example: ALR10-B-B1

Penetrator™ - For Mobile, Cellular & Paging Applications

BMR6*, BMR8* – SMR 806-869 MHz
BCR6*, BCR8* – Cellular 824-894 MHz
BPR6*, BPR8* – Paging 928-960 MHz

*** Pattern desired (O, A, B, D, H) must be specified after model number.**
U.S. Patent 4,518,969

The novel side fed dipole design of these antennas provides 6 dBd or 8 dBd omnidirectional gain and bandwidth up to 100 MHz. All feature constant beam tilt, heavy null fill, and have been VSWR tested. Depending upon the specific required area of coverage, horizontal patterns O, A, B, D or H are available.

To Order, Specify:
1. Frequency - Model - BMR, BCR, BPR
2. Gain - Use omnidirectional gain - 6, 8 dB
3. Options
4. Pattern - O, A, B, D or H
5. Mounting Bracket - B1 or B2
6. Beamtilt

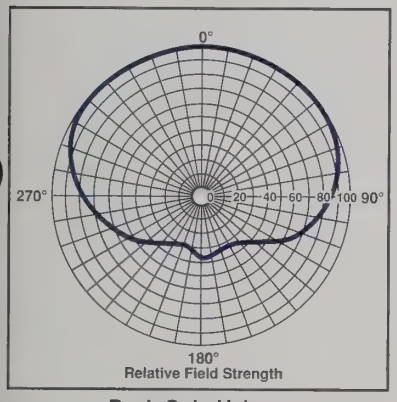
Example: BCR8-A-B1

WHEN ORDERING:
Provide downtilt when non-standard or ordering OPTION-J, OPTION-L, or J-CABLES.

PATTERN AND GAIN SPECIFICATIONS

Gain shown is the peak value over the operating bandwidth.

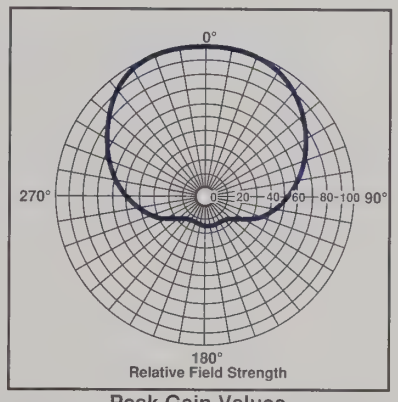
PATTERN A
220° COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMR6A, BCR6A, BPR6A	8.3 dB
BMR8A, BCR8A, BPR8A	10.3 dB

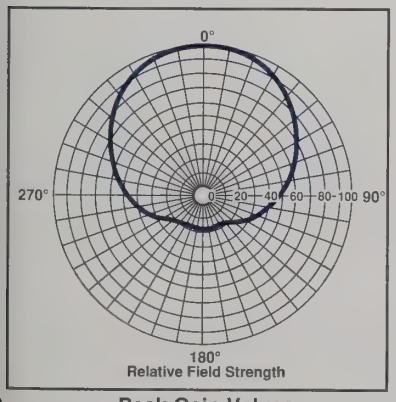
PATTERN B
140° COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMR6B, BCR6B, BPR6B	10.0 dB
BMR8B, BCR8B,BPR8B	12.0 dB

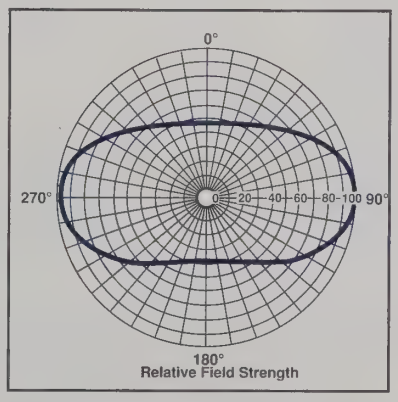
PATTERN D
120° COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMR6D, BCR6D, BPR6D	10.3 dB
BMR8D, BCR8D, BPR8D	12.3 dB

PATTERN H
TWO SECTOR COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMR6H, BCR6H, BPR6H	9.4 dB
BMR8H, BCR8H,BPR8H	11.4 dB

PATTERN O
360° COVERAGE

(Omnidirectional ± 1.5 dB Maximum)

Average Gain Values

Model	Gain (dBd)
BMR6, BCR6, BPR6	6.0 dB
BMR8, BCR8, BPR8	8.0 dB

Penetrator™ - For Mobile, Cellular & Paging Applications

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Design Frequency Band - MHz Model BMR Model BCR Model BPR	 806-869 (63 MHz Bandwidth) 824-894 (70 MHz Bandwidth) 928-960 (32 MHz Bandwidth)
Polarization	Vertical
Null Fill 8 dB 6 dB	Uniform Signal Strength on Ground From Antenna Site to Horizon None
Beam Tilt 8 dB, 6SP (Standard) 6 dB	0.75° 0.0°
Input VSWR	1.5:1 Minimum
Input Connector	N-female 50 Ohms
Max. Input Power - Watts	500
Lightning Protection	Top Rod Grounded to Base Mount

MECHANICAL SPECIFICATIONS

SERIES 6 MODELS

Length - ft. (m)	5.5 (1.68) Plus Lightning Rod
Diameter - in. (mm)	6-5/8 (168.3)
Weight - lbs. (kg) – Flanged – With B1 Bracket – With B2 Bracket	 26 (11.7) 58 (26.1) 42 (18.9)
Survival Wind Force - psf (100 mph)	40
Max. Wind Shear - lbs. (100 mph)	84
Wind Loading Area - ft.² (m²) Flat Plate Equivalent	 2.1 (0.2)
Mounting	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount
Materials	Aluminum and Fiberglass (Blue Standard)

SERIES 8 MODELS

Length - ft. (m)	8 (2.44) Plus Lightning Rod
Diameter - in. (mm)	6-5/8 (168.3)
Weight - lbs. (kg) – Flanged – With B1 Bracket – With B2 Bracket	 36 (16.2) 68 (30.6) 52 (23.4)
Survival Wind Force - psf (100 mph)	40
Max. Wind Shear - lbs. (100 mph)	120
Wind Loading Area - ft.² (m²) Flat Plate Equivalent	 3.0 (.278)
Mounting	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount
Materials	Aluminum and Fiberglass (Blue Standard)

OPTIONS AVAILABLE

- Coverage of any band up to 100 MHz wide (between 806-960 MHz) with VSWR under 1.5:1
- Design to 160 psf (200 mph) wind survival
- Other electrical beam tilt values.
- Large beam tilt without significant gain reduction (option L)
- Power handling up to 3000 Watts.
- Option J: Field adjustable downtilt

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Penetrator™ - For Mobile, Cellular & Paging Applications

BMR10*, BMR12* – SMR 806-869 MHz
BCR10*, BCR12* – Cellular 824-894 MHz
BPR10*, BPR12* – Paging 928-960 MHz

*** Pattern desired (O, A, B, D, H) must be specified after model number.**
U.S. Patent 4,518,969

The novel side fed dipole design of these antennas provides 10 dBd or 12 dBd omnidirectional gain and bandwidth up to 100 MHz. All feature constant beam tilt, heavy null fill, and have been VSWR tested. Depending upon the specific required area of coverage horizontal patterns O, A, B, D or H are available.

To Order, Specify:
1. Frequency - Model - BMR, BCR, BPR
2. Gain - 10, or 12 dB
3. Options
4. Pattern - O, A, B, D or H
5. Mounting Bracket - B1 or B2
6. Beamtilt

Example: BMR10-A-B1

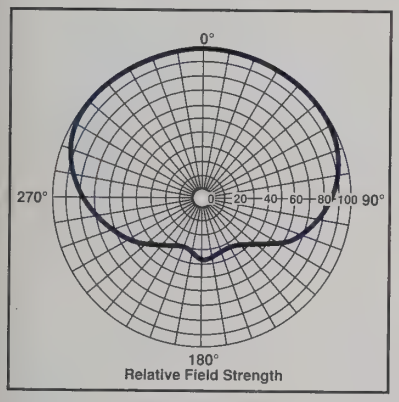
OPTIONS AVAILABLE
- Coverage of any band up to 100 MHz wide (between 806 and 960 MHz) with VSWR under 1.5:1.
- Design to 160 psf (200 mph) wind survival (13' model only).
- Option HW not available on 12 dB models
- Other electrical beam tilt values.
- Large beam tilt without significant gain reduction. (Option L)
- Option J
- Power handling up to 3000 watts

WHEN ORDERING:
Provide downtilt when non-standard or ordering OPTION-J, OPTION-L, or J-CABLES.

PATTERN AND GAIN SPECIFICATIONS

Gain shown is the peak value over the operating bandwidth.

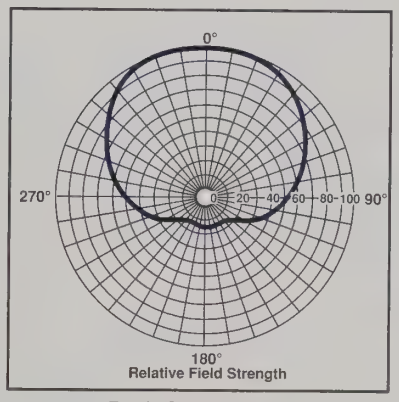
PATTERN A
220° COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMR10A, BCR10A, BPR10A	12.3 dB
BMR12A, BCR12A, BPR12A	14.3 dB

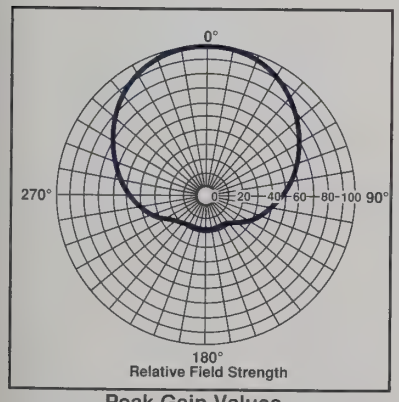
PATTERN B
140° COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMR10B, BCR10B, BPR10B	14.0 dB
BMR12B, BCR12B, BPR12B	16.0 dB

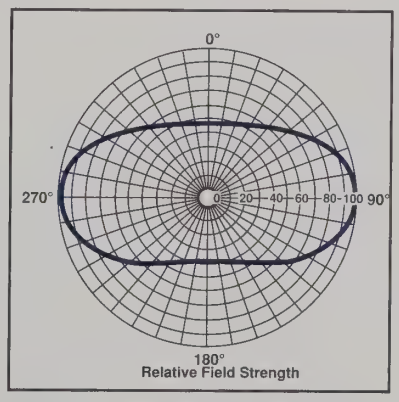
PATTERN D
120° COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMR10D, BCR10D, BPR10D	14.3 dB
BMR12D, BCR12D, BPR12D	16.3 dB

PATTERN H
TWO SECTOR COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMR10H, BCR10H, BPR10H	13.4 dB
BMR12H, BCR12H, BPR12H	15.4 dB

PATTERN O
360° COVERAGE

(Omnidirectional ± 1.5 dB Maximum)

Average Gain Values

Model	Gain (dBd)
BMR10, BCR10, BPR10	10.0 dB
BMR12, BCR12, BPR12	12.0 dB

Penetrator™ - For Mobile, Cellular & Paging Applications

SPECIFICATIONS

MECHANICAL SPECIFICATIONS

Design Frequency Band - MHz Model BMR Model BCR Model BPR	 806-869 (63 MHz Bandwidth) 824-894 (70 MHz Bandwidth) 928-960 (32 MHz Bandwidth)
Polarization	Vertical
Null Fill	Approx. Uniform Signal Strength on Ground From Antenna Site to Horizon.
Beam Tilt (Standard)	-3/4°
Input VSWR	1.5:1 Maximum
Input Connector	N-female 50 Ohms
Max. Input Power - Watts	500
Lightning Protection	Top Rod Grounded to Base Mount

MECHANICAL SPECIFICATIONS SERIES 10 MODELS

Length - ft. (m)	13 (3.96) Plus Lightning Rod
Diameter - in. (mm)	6-5/8 (168.3)
Weight - lbs. (kg) – Flanged – With B1 Bracket – With B2 Bracket	 55 (24.8) 87 (39.2) 71 (32.0)
Survival Wind Force - psf (100 mph)	40
Max. Wind Shear - lbs. (100 mph)	192
Wind Loading Area - ft.² (m²) Flat Plate Equivalent	 4.8 (.450)
Mounting	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount
Materials	Aluminum and Fiberglass (Blue Standard)

SERIES 12 MODELS

Length - ft. (m)	20 (6.1) Plus Lightning Rod
Diameter - in. (mm)	6-5/8 (168.3)
Weight - lbs. (kg) – Flanged – With B1 Bracket – With B2 Bracket* (100 mph)	 92 (41.4) 124 (55.8) 108 (48.6)
Survival Wind Force - psf (100 mph)	40
Max. Wind Shear - lbs. (100 mph)	304
Wind Loading Area - ft.² (m²) Flat Plate Equivalent	 7.6 (.706)
Mounting Options	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount; 3/4" U-bolt Supplied.
Materials	Aluminum and Fiberglass (Blue Standard)

*B2 Bracket not recommended for 12 dB model.

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The Penetrator™ - For Multiple Service Applications

BMS10* 806-906, 850-950 MHz
BMS12* 806-906, 850-950 MHz

*** Pattern desired (O, A, B, D, H) and frequency must be specified after model number. U.S. Patent 4,518,969.**

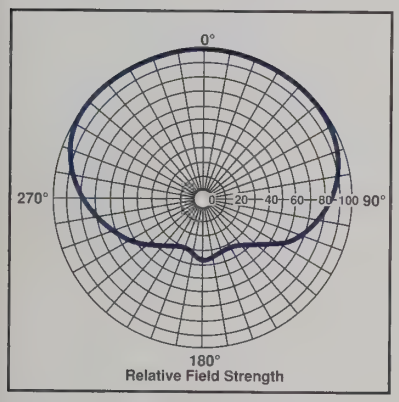
These antennas have been specifically designed for wide band, multiservice coverage with either 10 dBd or 12 dBd omnidirectional gain over the entire bandwidth. Depending on the specific required area of coverage, horizontal patterns O, A, B, D or H are available.

To Order, Specify:
1. Frequency - Model - BMS
   806-906 MHz (Specify "L")
   850-950 MHz (Specify "U")
2. Gain - 10 or 12 dB
3. Options
4. Pattern - O, A, B, D or H
5. Mounting Bracket - B1 or B2
   (B2 not recommended for 12 dB model)
6. Beamtilt
   Example: BMSL10-A-B1

PATTERN AND GAIN SPECIFICATIONS

Gain shown is the peak value over the operating bandwidth.

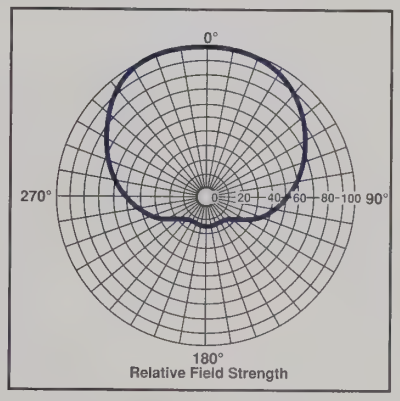
PATTERN A
220° COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMS10A	12.3 dB
BMS12A	14.3 dB

PATTERN B
140° COVERAGE



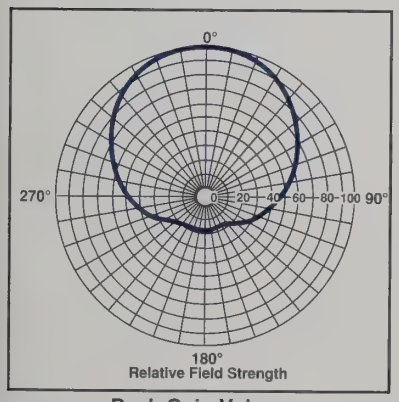
Peak Gain Values

Model	Gain (dBd)
BMS10B	14.0 dB
BMS12B	16.0 dB

OPTIONS AVAILABLE
- Coverage of any band up to 100 MHz wide (between 806 and 960 MHz) with VSWR under 1.5:1.
- Design to 160 psf (200 mph) wind survival (13' model only)
- Other electrical beam tilt values.
- Large beam tilt without significant gain reduction. (Option L)

WHEN ORDERING:
Provide downtilt when non-standard or ordering OPTION-J, OPTION-L, or J-CABLES.

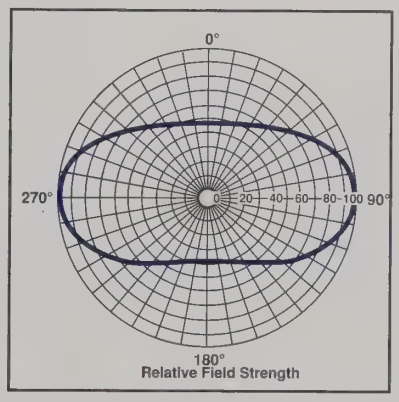
PATTERN D
120° COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMS10D	14.3 dB
BMS12D	16.3 dB

PATTERN H
TWO SECTOR COVERAGE



Peak Gain Values

Model	Gain (dBd)
BMS10H	13.4 dB
BMS12H	15.4 dB

PATTERN O
360° COVERAGE

(Omnidirectional ± 1.5 dB Maximum)

Average Gain Values

Model	Gain (dBd)
BMS10	10.0 dB
BMS12	12.0 dB

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The Penetrator™ - For Multiple Service Applications

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Design Frequency Band - MHz Model BMS-L BMS-U	 806-906 (100 MHz Bandwidth) 850-950 (100 MHz Bandwidth)
Polarization	Vertical
Null Fill	Approx. Uniform Signal Strength on Ground From Antenna Site to Horizon.
Beam Tilt (Standard)	-3/4°
Input VSWR	1.5:1 Maximum*
Input Connector	N-female 50 Ohms
Max. Input Power - Watts	500
Lightning Protection	Top Rod Grounded to Base Mount

*VSWR may go to 1.6:1 above 950 MHz

MECHANICAL SPECIFICATIONS
SERIES 10 MODELS

Length - ft. (m)	13 (3.96) Plus Lightning Rod
Diameter - in. (mm)	6-5/8 (168.3)
Weight - lbs. (kg) – Flanged – With B1 Bracket – With B2 Bracket	 55 (24.8) 87 (39.2) 71 (32.0)
Survival Wind Force - psf (100 mph)	40
Max. Wind Shear - lbs. (100 mph)	192
Wind Loading Area - ft.² (m²) Flat Plate Equivalent	 4.8 (.450)
Mounting	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount
Materials	Aluminum and Fiberglass (Blue Standard)

SERIES 12 MODELS

Length - ft. (m)	20 (6.1) Plus Lightning Rod
Diameter - in. (mm)	6-5/8 (168.3)
Weight - lbs. (kg) – Flanged – With B1 Bracket – With B2 Bracket (100 mph)	 92 (41.4) 124 (55.8) 108 (48.6)
Survival Wind Force - psf (100 mph)	40
Max. Wind Shear - lbs. (100 mph)	304
Wind Loading Area - ft.² (m²) Flat Plate Equivalent	 7.6 (.706)
Mounting Options	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount; 3/4" U-bolt Supplied.
Materials	Aluminum and Fiberglass (Blue Standard)

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Penetrator™ - Dual Models for Cellular, Mobile & Paging Applications

BMR8/6* – SMR 806-869 MHz
BCR8/6* – Cellular 824-894 MHz
BPR8/6* – Paging 928-960 MHz

*** Pattern desired (O, A, B, D, H) must be specified after model number.**
U.S. Patent 4,518,969

These dual models feature two antennas of up to 70 MHz bandwidth in one weatherproof radome. Omnidirectional gain of 8 and 6 dBd is standard while horizontal patterns O, A, B, D, or H provide the maximum gains listed below.

To Order, Specify:
1. Frequency - Model - BMR, BCR or BPR
2. Gain - 8/6 dB
3. Options
4. Pattern - O, A, B, D or H
5. Mounting Bracket - B1 or B2
6. Beamtilt

Example: BMR8/6-H-B1

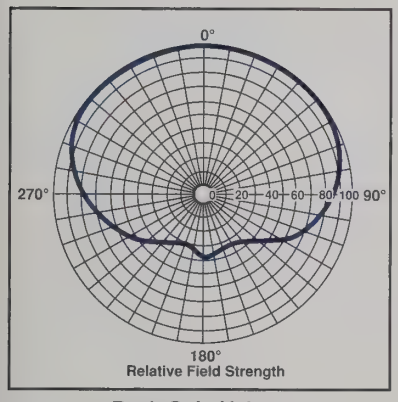
OPTIONS AVAILABLE
- Coverage of any band up to 100 MHz wide (between 806-960 MHz) with VSWR under 1.5:1
- Design to 160 psf (200 mph) wind survival
- Other electrical beam tilt values
- Large beam tilt without significant gain reduction (Option L).
- Null fill available for B( )R8.
- Power handling to 1000 Watts.

WHEN ORDERING:
Provide downtilt when non-standard or ordering OPTION-J, OPTION-L, or J-CABLES.

PATTERN AND GAIN SPECIFICATIONS

Gain shown is the peak value over the operating bandwidth.

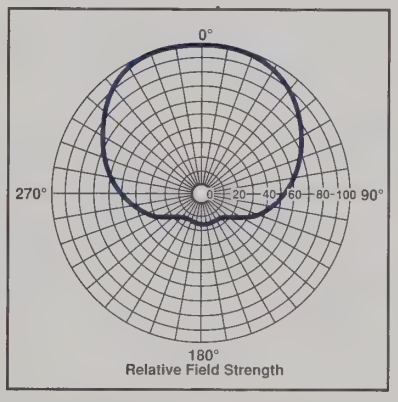
PATTERN A
220° COVERAGE



Peak Gain Values

Model	Gain (dBd)	
BMR8/6A	10.3 dB	8.3 dB
BCR8/6A	10.3 dB	8.3 dB
BPR8/6A	10.3 dB	8.3 dB

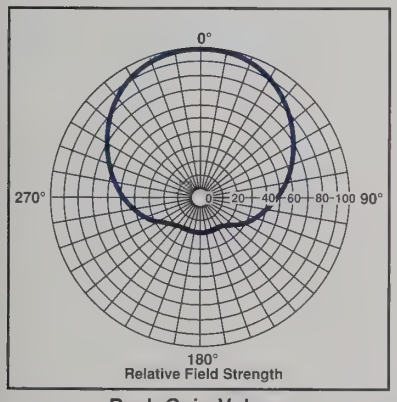
PATTERN B
140° COVERAGE



Peak Gain Values

Model	Gain (dBd)	
BMR8/6B	12.0 dB	10.0 dB
BCR8/6B	12.0 dB	10.0 dB
BPR8/6B	12.0 dB	10.0 dB

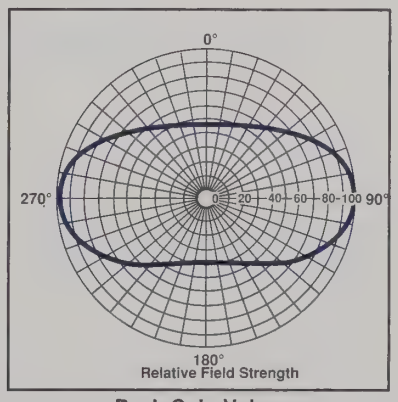
PATTERN D
120° COVERAGE



Peak Gain Values

Model	Gain (dBd)	
BMR8/6D	12.3 dB	10.3 dB
BCR8/6D	12.3 dB	10.3 dB
BPR8/6D	12.3 dB	10.3 dB

PATTERN H
TWO SECTOR COVERAGE



Peak Gain Values

Model	Gain (dBd)	
BMR8/6H	11.4 dB	9.4 dB
BCR8/6H	11.4 dB	9.4 dB
BPR8/6H	11.4 dB	9.4 dB

PATTERN O
360° COVERAGE

(Omnidirectional ± 1.5 dB Maximum)

Average Gain Values

Model	Gain (dBd)
BMR8/6, BCR8/6, BPR8/6	8 dB 6 dB

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Penetrator™ - Dual Models for Cellular, Mobile & Paging Applications

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Design Frequency Band - MHz Model BMR Model BCR Model BPR		 806-869 (63 MHz Bandwidth) 824-894 (70 MHz Bandwidth) 928-960 (32 MHz Bandwidth)
Polarization		Vertical
Null Fill	8	Approx. uniform signal strength on ground from antenna site to horizon
	6	None (Standard)
Beam Tilt (Standard)	8	- 3/4°
	6	0°
Input VSWR		1.5:1 Maximum
Input Connector		N-female 50 Ohms
Max. Input Power - Watts		500
Lightning Protection		Top Rod Grounded to Base Mount

Note: Isolation between antennas greater than 30 dB.

MECHANICAL SPECIFICATIONS

Length - ft. (m)	13 (3.96) Plus Lightning Rod
Diameter - in. (mm)	6-5/8 (168.3)
Weight - lbs. (kg) – Flanged – With B1 Bracket – With B2 Bracket	 55 (24.8) 87 (39.2) 71 (32.0)
Survival Wind Force - psf (100 mph)	40
Max. Wind Shear - lbs. (100 mph)	192
Wind Loading Area - ft.² (m^2) Flat Plate Equivalent	 4.84 (.436)
Mounting Options	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount
Materials	Aluminum and Fiberglass (Blue Standard)

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BMR10/8* – SMR 806-869 MHz
BCR10/8* – Cellular 824-894 MHz
BPR10/8* – Paging 928-960 MHz

*** Pattern desired (O, A, B, D, H) must be specified after model number.**
U.S. Patent 4,518,969

These dual models feature two antennas of up to 70 MHz bandwidth in one weatherproof radome. Omnidirectional gain of 8 and 10 dBd is standard while horizontal patterns O, A, B, D, or H provide the maximum gains listed below.

PATTERN AND GAIN SPECIFICATIONS Gain shown is the peak value over the operating bandwidth.

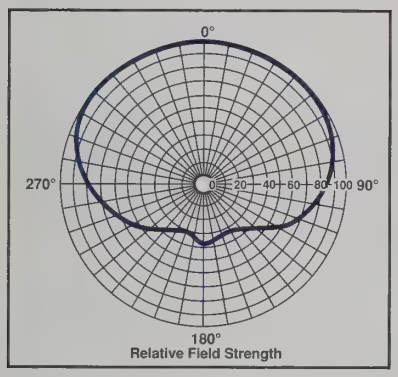
To Order, Specify:
1. Frequency - Model - BMR, BCR or BPR
2. Gain - 10/8 dB
3. Options
4. Pattern - O, A, B, D or H
5. Mounting Bracket - B1 or B2
6. Beamtilt

Example: BMR10/8-A-B1

OPTIONS AVAILABLE
- Customer adjustable tilt on 10 dB antenna (Option J).
- Power handling to 3000 Watts.
- Coverage of any band up to 100 MHz wide (between 806-960 MHz) with VSWR under 1.5:1
- Other electrical beamtilt values

WHEN ORDERING:
Provide downtilt when non-standard or ordering OPTION-J, OPTION-L, or J-CABLES.

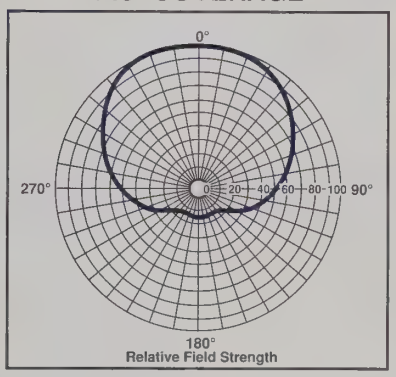
PATTERN A
220° COVERAGE



Peak Gain Values

Model	Gain (dBd)	
BMR10/8A	12.3 dB	10.3 dB
BCR10/8A	12.3 dB	10.3 dB
BPR10/8A	12.3 dB	10.3 dB

PATTERN B
140° COVERAGE



Peak Gain Values

Model	Gain (dBd)	
BMR10/8B	14.0 dB	12.0 dB
BCR10/8B	14.0 dB	12.0 dB
BPR10/8B	14.0 dB	12.0 dB

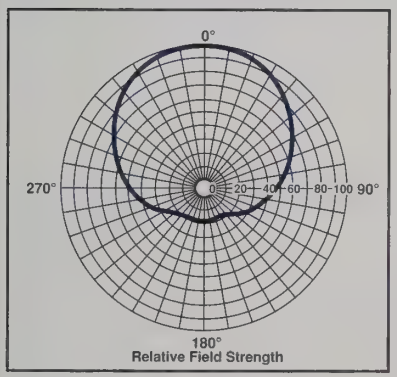
PATTERN O
360° COVERAGE

(Omnidirectional ± 1.5 dB Maximum)

Average Gain Values

Model	Gain (dBd)	
BMR10/8, BCR10/8, BPR10/8	10 dB	8 dB

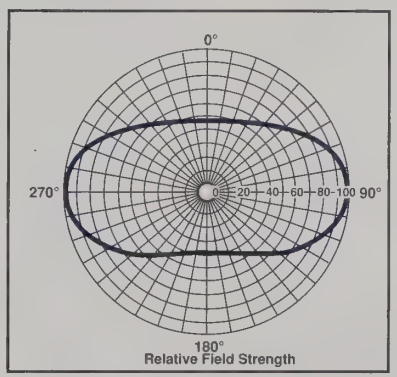
PATTERN D
120° COVERAGE



Peak Gain Values

Model	Gain (dBd)	
BMR10/8D	14.3 dB	12.3dB
BCR10/8D	14.3 dB	12.3dB
BPR10/8D	14.3 dB	12.3dB

PATTERN H
TWO SECTOR COVERAGE



Peak Gain Values

Model	Gain (dBd)	
BMR10/8H	13.4 dB	11.4 dB
BCR10/8H	13.4 dB	11.4 dB
BPR10/8H	13.4 dB	11.4 dB

Penetrator™ - Dual Models for Cellular, Mobile & Paging Applications

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Design Frequency Band - MHz Model BMR10/8 Model BCR10/8 Model BPR10/8	 806-869 (63 MHz Bandwidth) 824-894 (70 MHz Bandwidth) 928-960 (32 MHz Bandwidth)
Polarization	Vertical
Null Fill 10 dB, 8 dB	Approx. Uniform Signal Strength on Ground From Antenna Site to Horizon.
Beam Tilt (Standard) 10 dB, 8 dB	-3/4°
Input VSWR	1.5:1 Maximum Each Input
Input Connector	N-female Each Input
Max. Input Power - Watts	500 Each

Note: Isolation between antennas greater than 30 dB.

MECHANICAL SPECIFICATIONS

Length - ft. (m)	20 (6.1) Plus Lightning Rod
Diameter - in. (mm)	6-5/8 (168.3)
Weight - lbs. (kg) – Flanged – With B1 Bracket – With B2 Bracket* (100 mph)	 92 (41.4) 124 (55.8) 108 (48.6)
Survival Wind Force - psf (100 mph)	40
Max. Wind Shear - lbs. (100 mph)	304
Wind Loading Area - ft.² (m²) Flat Plate Equivalent	 7.6 (.706)
Mounting Options	Flange Top Mount, Tower Leg Mount, Vertical Pole Side Mount; 3/4" U-Bolt Hardware Supplied
Materials	Aluminum and Fiberglass (Blue Standard)

* B2 bracket not recommended for this model.

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Cellular Control Station Antennas

CEL-1/CEL-1A **Unity Gain**
CEL-3S **3 dB Gain**

The CEL-1 and CEL-3S Series of control station antennas for 800 MHz mobile telephone service are ruggedly designed to perform in the most demanding environments. Both models feature copper and copper alloy internal construction, all stainless steel ferrules, soft soldered electrical joints – encased in a heavy wall weather-resistant fiberglass radome. A white Polymer coating double seals the fiberglass and provides a smooth, glossy finish.

The antennas are easily removed for storage without handling feed cable due to direct electrical termination at the base. Available in two frequency bands: 824-894 for Cellular Radio (CEL-1, CEL-3S) and 806-869 for Trunking (CEL-1A).

Ordering Information

Item No.	Frequency Range	Description
CEL-1A	806-869	2', Unity Gain Cellular Antenna
CEL-1	825-894	2', Unity Gain Cellular Antenna
CEL-3S	825-894	4', 3 dB Gain Cellular Antenna

Mounting & Accessories

Item No.	Description
PD10290	Deck Mount
N275F	Universal Mount
N295F	Rail Mount

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

CEL-1

ELECTRICAL SPECIFICATIONS	CEL-1A CEL-1	CEL-3
Frequency - MHz		
Cellular	824-894	
Trunking	806-869	
Gain - dB	Unity	3
Impedance - Ohms	50	
Polarization	Vertical	
Maximum Power Input - Watts	100	
Termination	Type-N female	

MECHANICAL SPECIFICATIONS	CEL-1A CEL-1	CEL-3S
Antenna	Fiberglass Radome with White Polymer Coating	
Elements	Copper	
Base Fitting	Chrome Plated Brass; 1"-14 Threads male	
Number of Sections	1	
Overall Length - ft. (m)	1.6 (.5)	4 (1.2)
Mounting Type	Deck (PD10290)	Universal (N275F)
Weight - lbs. (kg)	.75 (.34)	1.5 (.680)
Shipping Weight - lbs. (kg)	1.0 (.45)	5.0 (2.25)
Shipping Mode	UPS	UPS

Omnidirectional Collinear Antennas

Super Stationmaster™ Series	
PD1108	**5.0 dBd Gain**
PD1109	**7.5 dBd Gain**
PD1109E	**7.5 dBd Gain**
PD10041 Heavy Duty	**7.5 dBd Gain**
PD10041E Heavy Duty	**7.5 dBd Gain**
PD1110	**9.0 dBd Gain**
PD10017	**10 dBd Gain**

These center-fed collinear antennas ensure consistent gain and impedance across the operating frequency band and are specifically designed to meet various omnidirectional requirements for mobile radio services in the 806-960 MHz bands. Copper alloy radiating elements are encased in a weatherproof fiberglass low loss housing and permanently attached to a 6061-T6 aluminum support pipe.

The PD10041 antenna is a rugged version of the PD1109 having a wind velocity rating of 125 mph (200 km/hr). A pressurization option (P) is available for PD1108, PD1109, PD1109E, PD1110, PD10041, PD10041E, PD10017 and high wind version antennas facilitating pressurization to 12 PSIG. *The above antennas may be mounted inverted. Specify invert mount option I. The Super Stationmaster™ Series is available with high wind version radomes at 200 mph rated wind velocity.*

Various reflector assemblies are shown on page 67. Contact our Customer Service Department for specific pattern requirements.

- **Fiberglass construction** — Protects radiating elements in hostile environments.
- **Copper radiating elements** — Minimizes possible generation of intermod products.
- **Center-fed design** — Eliminates beamtilt across the band.

PD1108 **PD1109 PD10041** **PD1110 PD10017**

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Omnidirectional Collinear Antennas

Ordering Information

Item Number	High Wind Version	Frequency Range - MHz
PD1108-1		806-869
PD1108-2		825-890
PD1108-3		900-960
PD1108-4		820-880
PD1108-5		835-895
PD1109-1		806-869
PD1109E		824-894
PD1109-5		860-920
PD1109-6		895-960
PD10041-1		806-869
PD10041E		824-894
PD10041-3		860-920
PD10041-4		900-960
PD1110-1		800-836
PD1110-2	PD1110HW-2	820-855
PD1110-3	PD1110HW-3	845.5-880.5
PD1110-4		865-900
PD1110-5	PD1110HW-5	925-960
PD1110-6	PD1110HW-6	806-841
PD1110-7		831-866
PD1110-8		862-898
PD1110-9	PD1110HW-9	900-935
PD1110-10		885-920
PD10017-1		800-836
PD10017-2	PD10017HW-2	820-855
PD10017-3	PD10017HW-3	845.5-880.5
PD10017-4		865-900
PD10017-5	PD10017HW-5	862-898
PD10017-6	PD10017HW-6	925-960
PD10017-7	PD10017HW-7	806-841
PD10017-8		900-935
PD10017-9		831-866

ELECTRICAL SPECIFICATIONS	PD1108	PD1109	PD1109E
Frequency Range - MHz	806-960	806-960	824-894
Gain - dBd	5	7.5	7.5
Bandwidth - MHz for 1.5:1 VSWR	60	60	70
Vertical Beamwidth 1/2 Power Points	12°	8°	8°
Maximum Power Input - Watts	500	500	500
Lightning Protection	Direct Ground	Direct Ground	Direct Ground
Termination - Direct	N-female	N-female	N-female
Flexible Extension Supplied - in. (mm)	18 (457) RG393/U with N-male connectors		

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD1108	PD1109	PD1109E
Overall Length - ft. (m)	8.27 (2.52)	10.42 (3.18)	10.42 (3.18)
Element Housing Length - ft. (m)	6.10 (1.86)	8.25 (2.52)	8.25 (2.52)
Support Pipe Diameter - in. (mm)	2-3/4 (70)	2-3/4 (70)	2-3/4 (70)
Support Pipe Length - in. (mm)	24 (610)	24 (610)	24 (610)
Weight - lbs. (kg)	10 (4.5)	17 (7.71)	17 (7.71)
Radiating Element Material	Copper	Copper	Copper
Element Housing Material	Fiberglass	Fiberglass	Fiberglass
Support Pipe Material	6061-T6 Aluminum	6061-T6 Aluminum	6061-T6 Aluminum
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	0.85 (.079)	1.28 (0.119)	1.28 (0.119)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	34 (15.5)	51 (23.2)	51 (23.2)
Bending Moment @ 100 mph 1 in. (25.4 mm) Below Top of Support Pipe - ft./lbs. (m/kg)	68 (9.4)	180 (24.9)	180 (24.9)
Mounting Hardware - Supplied	PD46 Clamp Set	PD46 Clamp Set	PD46 Clamp Set
Mounting Hardware - Optional	PD241 Wall Mount, PD246 Pole Mount, PD10024 Side Mount (Short), PD10028 Side Mount (Long)		
Shipping Weight - lbs. (kg)	29 (13.2)	35 (15.9)	35 (15.9)
Shipping Volume - ft.^{3} (m^3)	1.4 (.04)	2.43 (.068)	2.43 (.068)
Shipping Mode	Common Carrier	Common Carrier	Common Carrier

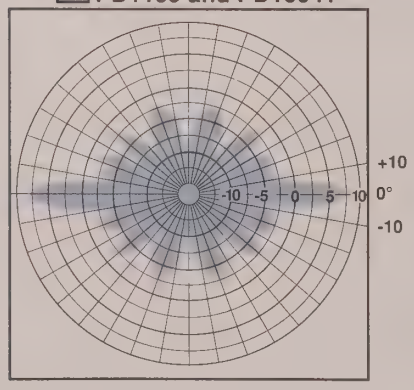
Omnidirectional Collinear Antennas

ELECTRICAL SPECIFICATIONS	PD10041	PD10041E	PD1110	PD10017
Frequency Range - MHz	806-960	824-894	806-960	800-960
Gain - dBd	7.5	7.5	9.0	10.0
Bandwidth - MHz for 1.5:1 VSWR	60	70	35	35
Vertical Beamwidth 1/2 Power Points	8°	8°	6°	5.5°
Maximum Power Input - Watts	500	500	500	500
Lightning Protection	Direct Ground	Direct Ground	Direct Ground	Direct Ground
Termination - Direct	N-female	N-female	N-female	N-female
Flexible Extension Supplied - in. (mm)		18 (457) RG393/U with N-male connectors		

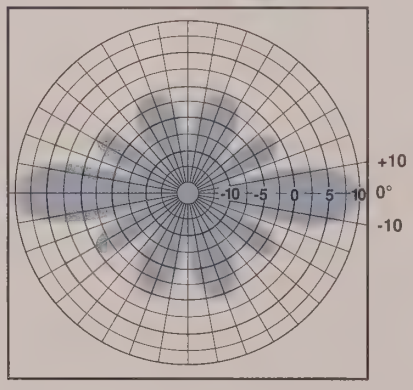
Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD10041	PD10041E	PD1110	PD10017
Overall Length - ft. (m)	10.42 (3.18)	10.42 (3.18)	13.17 (4.02)	15.17 (4.63)
Element Housing Length - ft. (m)	8.25 (2.52)	8.25 (2.52)	11 (3.35)	13 (3.96)
Support Pipe Diameter - in. (mm)	2-3/4 (70)	2-3/4 (70)	2-3/4 (70)	2-3/4 (70)
Support Pipe Length - in. (mm)	24 (610)	24 (610)	24 (610)	24 (610)
Weight - lbs. (kg)	19 (8.62)	19 (8.62)	20 (9.07)	25 (11.3)
Radiating Element Material	Copper	Copper	Copper	Copper
Element Housing Material	Fiberglass	Fiberglass	Fiberglass	Fiberglass
Support Pipe Material	6061-T6 Aluminum	6061-T6 Aluminum	6061-T6 Aluminum	6061-T6 Aluminum
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	1.33 (.124)	1.33 (.124)	1.70 (.158)	2.00 (.186)
Rated Wind Velocity - mph (km/hr)	125 (201)	125 (201)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	53.2 (24.1)	53.2 (24.1)	68 (30.9)	80 (36.4)
Bending Moment @ 100 mph 1 in. (25.4 mm) Below Top of Support Pipe - ft./lbs. (m/kg)	190 (26.3)	190 (26.3)	340 (47.1)	480 (66.5)
Mounting Hardware - Supplied	PD46 Clamp Set	PD46 Clamp Set	PD46 Clamp Set	PD46 Clamp Set
Mounting Hardware - Optional	PD241 Wall Mount, PD246 Pole Mount, PD10024 Side Mount (Short), PD10028 Side Mount (Long)			
Shipping Weight - lbs. (kg)	36 (16.3)	36 (16.3)	37 (16.8)	46 (20.9)
Shipping Volume - ft.³ (m³)	2.43 (.068)	2.43 (.068)	2.74 (.077)	2.97 (.084)
Shipping Mode	Common Carrier	Common Carrier	Common Carrier	Common Carrier

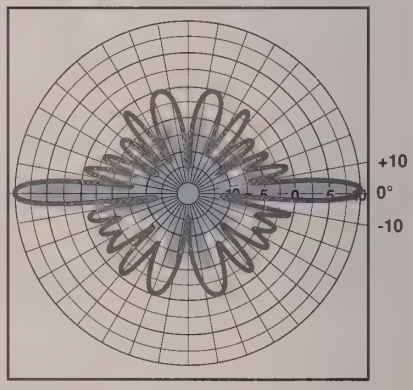
VERTICAL PATTERN
PD1109E and PD10041E
PD1109 and PD10041



VERTICAL PATTERN
PD1108



VERTICAL PATTERN
PD1110 PD10017



CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

Omnidirectional Collinear Broadband Antenna

AO8410 (previously PD10183-1) **10.0 dBd Gain**
AO8610 (previously PD10183-2) **10.0 dBd Gain**
AO9210 (previously PD10183-3) **10.0 dBd Gain**

These 10 dBd gain Omnidirectional Broadband Antennas cover the entire frequency range of 806-960 MHz in three bands, allowing for duplex operations of cellular base stations on a single, high gain antenna.

The design is a collinear transposed dipole array that features center-fed copper radiating elements, enclosed in a rigid 2-3/4 inch diameter fiberglass radome. The heavy-duty fiberglass construction protects the radiating elements from environmental hazards to survive maximum wind speeds of 187 mph.

The antenna terminates with a type N-female 50 ohm connector, with power input of 500 Watts. A heavy duty PD346 clamp set is supplied for vertically mounting the antenna to tower support.

Options available:
7/16 input
Electrical downtilt- AO8610 & AO9210
Reflector directionalization
Universal mounting- upright or invert

- **Fiberglass construction** — Survives 187 mph wind speed.
- **Broadband** — Reduces the need for multiple antennas.
- **Center-fed design** — Eliminates beamswing across the band.
- **High power capability** — Optional EIA input 1500 Watts.

Ordering Information

Item Number	Frequency Range - MHz
AO8410	806-869
AO8610	824-894
AO9210	870-960

COMPLIES WITH EIA 329 STANDARD

AO8410

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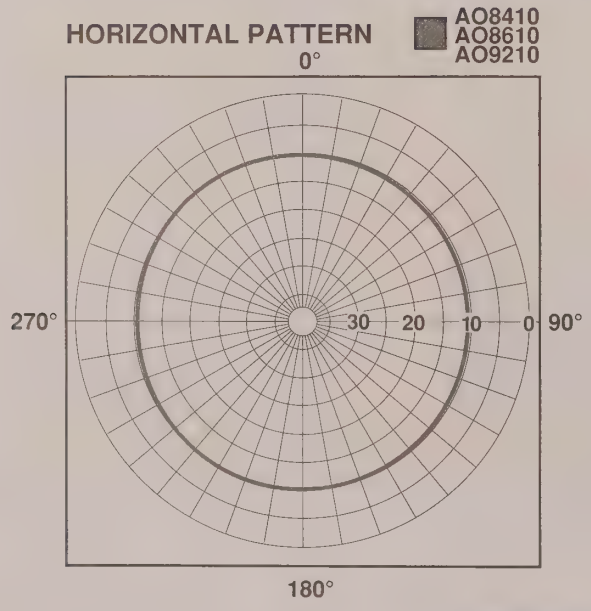
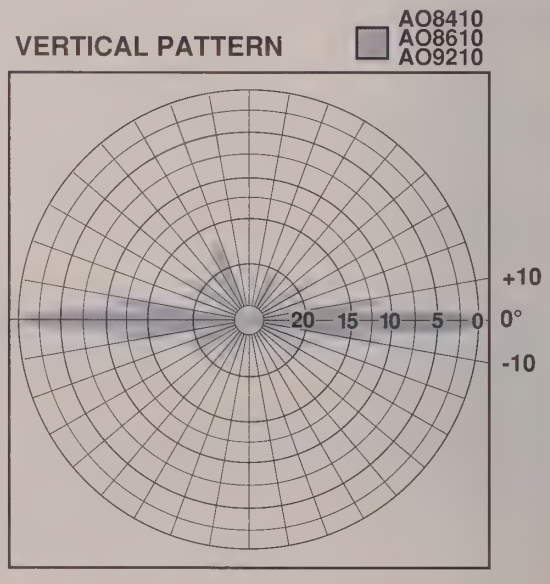
Omnidirectional Collinear Broadband Antenna

ELECTRICAL SPECIFICATIONS	AO8410	AO8610	AO9210
Frequency Range - MHz	806-869	824-894	870-960
Gain - dBd	10	10	10
Bandwidth - MHz	63	70	90
Vertical Beamwidth - Degrees	4.5	4.5	4.5
Power Input - Watts*	500	500	500
Lightning Protection	Direct Ground	Direct Ground	Direct Ground
Termination - Direct Fixed Option	N-female 7/16 DIN Connector	N-female 7/16 DIN Connector	N-female 7/16 DIN Connector
Flexible Extension - Optional	18 in. (457 mm) RG393/U Cable with N-male Connector**		
*EIA Input - Optional	1500 Watts	1500 Watts	1500 Watts

** PD10221-72, PD10221-96, PD10221-120, Cellflex 1/2" Cable

MECHANICAL SPECIFICATIONS	AO8410	AO8610	AO9210
Element Housing Length - ft. (m)	14 (4.27)	13.6 (4.15)	12.9 (3.93)
Support Pipe Diameter - in. (mm)	3.5 (88.9)	3.5 (88.9)	3.5 (88.9)
Support Pipe Length - in. (mm)	30 (762)	30 (762)	30 (762)
Support Pipe Material	6061-T6 Aluminum	6061-T6 Aluminum	6061-T6 Aluminum
Radiating Element Material	Copper	Copper	Copper
Radiating Housing Material	Fiberglass	Fiberglass	Fiberglass
Antenna Weight - lbs. (kg)	41 (18.60)	40 (18.14)	38 (17.24)
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	2.61 (.243)	2.55 (.237)	2.44 (.226)
Rated Wind Velocity - mph (km/hr)	187 (301)	187 (301)	187 (301)
Rated Wind Velocity with 1/2" Radial Ice - mph (km/hr)	160 (257)	160 (257)	160 (257)
Lateral Thrust @100 mph Wind - lbs. (kg)	104.5 (47.4)	102.1 (46.3)	97.7(44.3)
Bending Moment @ 100 mph Wind 1" Below Top Support Pipe - ft.lbs. (mk/g)	564 (78.0)	564 (78.0)	564 (78.0)
Mounting Hardware - Supplied	PD346 Clamp Set	PD346 Clamp Set	PD346 Clamp Set
Shipping Weight - lbs. (kg)	78 (35.1)	76 (34.2)	74 (33.3)





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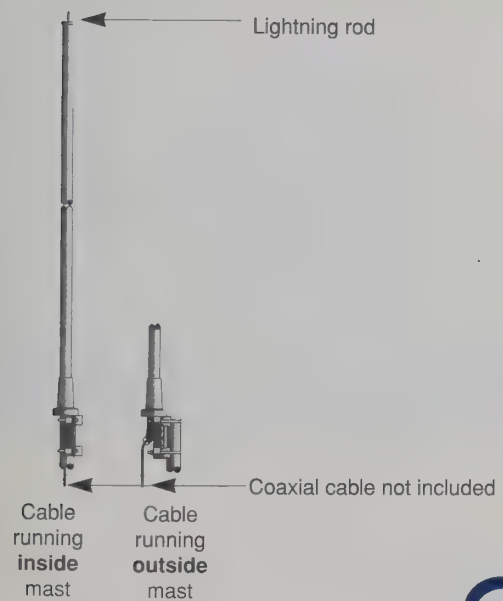
Omnidirectional Antennas

AO9009-2 — 9 dBd Gain

This omnidirectional antenna is a center-fed collinear antenna which ensures consistent gain and impedance over the entire frequency band of 890-960 MHz. The antenna allows duplex operations on a single antenna. The radiating elements are made of copper and enclosed in a low loss fiberglass housing. The base is made of die-cast aluminum. The heavy duty mounting hardware includes 2 U-shaped bolts and stainless steel hardware. The antenna base permits the antenna to be top mounted, with the cable running inside the support pipe. The antenna may also be side mounted with the cable running outside the support pipe. In addition, the antenna can also be mounted inverted, using the supplied hardware (read installation instructions before mounting).

- **DC ground and heavy-duty lightning protection** — Protects against damage from lightning strikes
- **Center-fed design** — Eliminates beamswing across the band
- **Small diameter** — Reduced windloading
- **Versatile base mount** — Permits various mounting capabilities



AO9009

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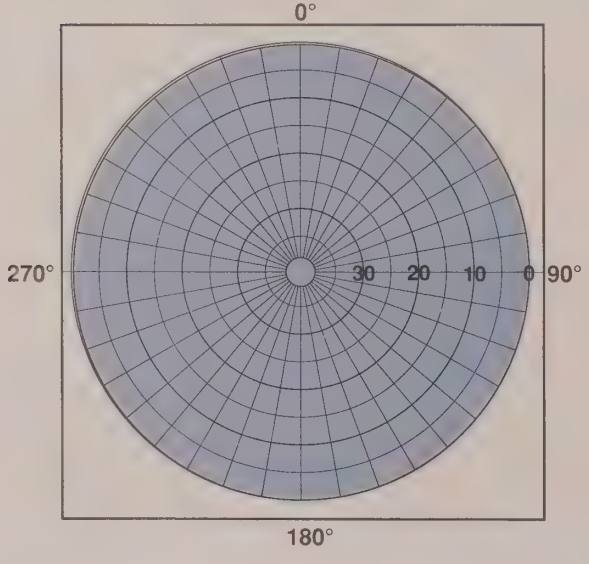
Omnidirectional Antennas

ELECTRICAL SPECIFICATIONS	AO9009
Frequency Range - MHz	890-960
Gain min. - dBd/(dBi)	9/11.1
Bandwidth - MHz for <1.5:1 VSWR*	70
Vertical Beamwidth - Degrees	6.5
Polarization	Vertical
Power, Max.- Watts	500
Lightning Protection	Direct Ground
Connector Type - Standard	7/16 DIN Female

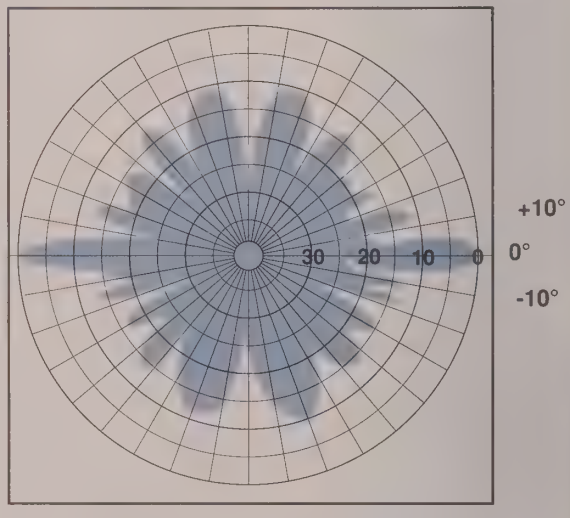
Note: All VSWR data referenced to 50 OHMS.

MECHANICAL SPECIFICATIONS	AO9009
Dimensions - ft. (m)	9.8(3)
Diameter - in. (mm)	1.96(50)
Weight - (incl. mtng. hdwre.) - lbs. (kg)	17.6(8.0)
Radiating Element Material	Copper
Radome Material	UV Resistant Fiberglass
Wind Loading Area - ft.² (m²)	1.506(0.14)
Rated Wind Velocity - mph (km/hr)	125(200)
Lateral Thrust @ Rated Winds - lbs. (kg)	44.1(20)
Mounting Hardware - Supplied	2 U-Bolts
Electrical Downtilt	Contact Celwave Sales Engineering

HORIZONTAL PATTERN



VERTICAL PATTERN 6.5° BEAMWIDTH



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Omnidirectional Collinear Antennas

PD10022 **Unity Gain**
PD1610 **3 dBd Gain**

The PD10022 is ideal for conventional, trunking, cellular and paging applications that require a wide vertical beamwidth. The antenna is constructed of copper alloy radiating elements with a protective Fibercast™ housing and a support pipe of 6061-T6 Aluminum. The antenna's surface area creates minimal wind resistance to conserve tower loading capacity.

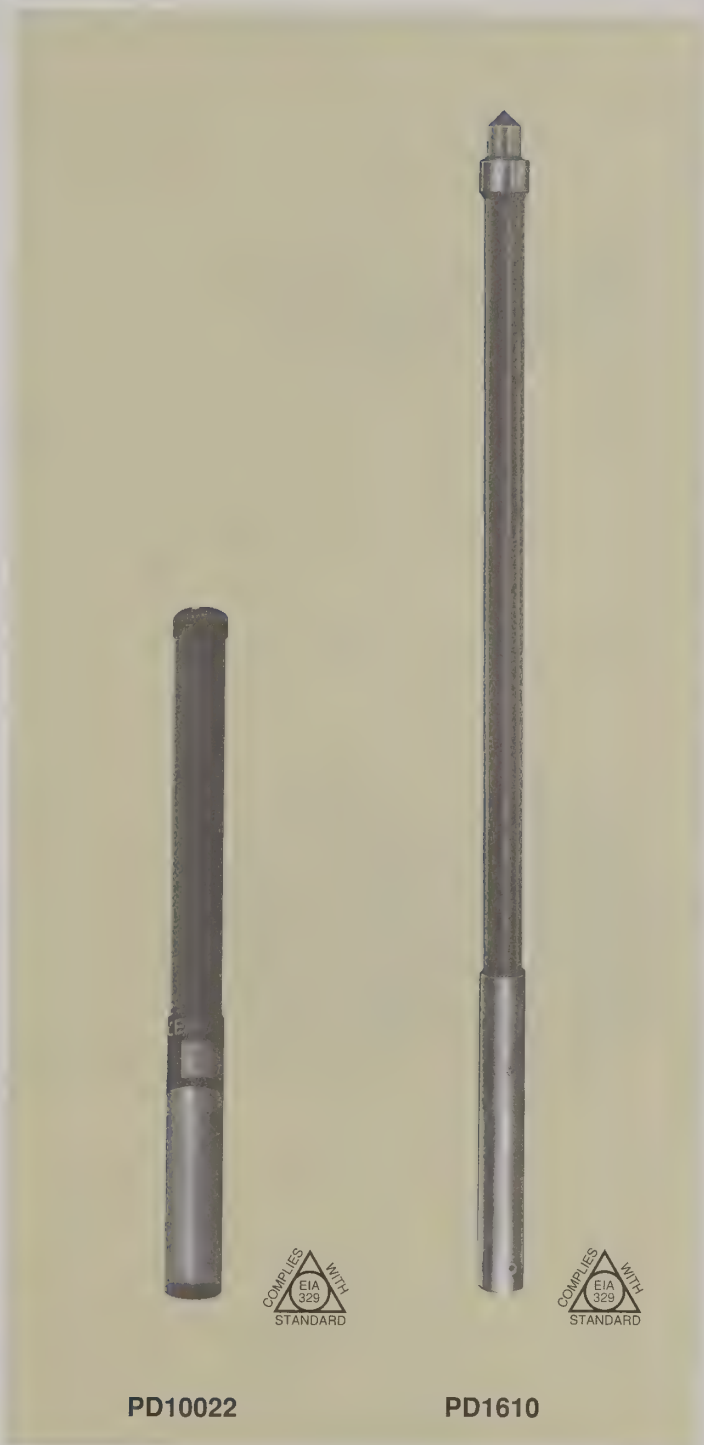
The PD1610 Collinear Antenna is specially designed to meet omnidirectional requirements for repeater control stations. This antenna is end-fed, utilizing copper alloy radiating elements encased in a weather-proof Fibercast™ support pipe. Minimal wind resistance conserves tower loading capacity.

- **Small diameter fiberglass construction** — Reduced wind loading.
- **Copper radiating elements** — Minimizes the possibility of intermod generation.
- **6061-T6 Aluminum support pipe** — Corrosion resistant for extended service.

Ordering Information

Item Number	Frequency Range - MHz
PD10022-1	806-880
PD10022-2	836-896
PD10022-3	880-960
PD1610-1	806-866
PD1610-2	820-880
PD1610-3	836-896
PD1610-4	896-960
PD1610-5	885-945

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.



PD10022 PD1610

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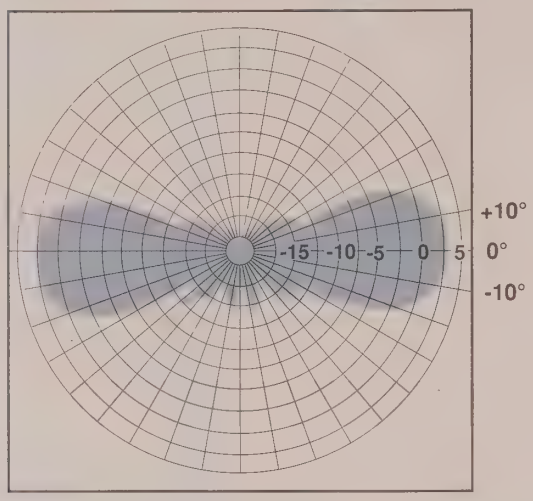
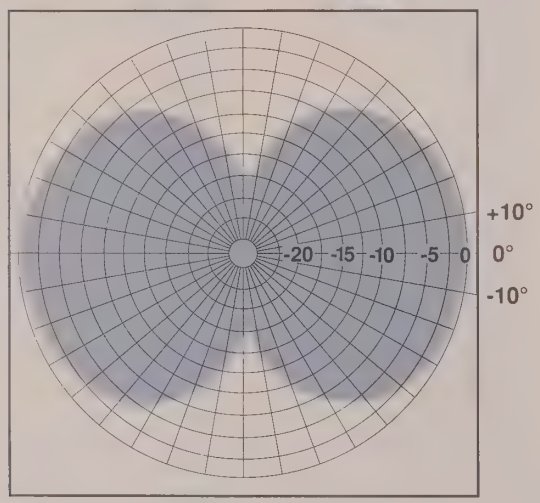
Omnidirectional Collinear Antennas

VERTICAL PATTERN ☐ PD1610



VERTICAL PATTERN ☐ PD10022



ELECTRICAL SPECIFICATIONS	PD10022	PD1610
Frequency Range - MHz	806-960	806-960
Gain - dBd	Unity	3
Bandwidth - MHz for 1.5:1 VSWR	70	70
Vertical Beamwidth 1/2 Power Points	80°	36°
Maximum Power Input - Watts	500	500
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Fixed	N-female	N-female
Flexible Extension - Supplied	18 in. (457 mm) RG393/U Flexible Cable with N-male Connector Attached	

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD10022	PD1610
Overall Length - in. (mm)	21 (533)	44 (1118)
Element Housing Length - in. (mm)	11 (279)	30 (762)
Support Pipe Diameter - in. (mm)	1.66 (42)	1.66 (42)
Support Pipe Mounting Length - in. (mm)	8 (203)	12 (305)
Weight - lbs. (kg)	1.6 (.7)	4 (1.81)
Radiating Element Material	Copper Alloy	Copper Alloy
Element Housing Material	1.5 in. (38 mm) Dia. Fibercast™ Radome	
Support Pipe Material	6061-T6 Aluminum	
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	.13 (.012)	.36 (.028)
Rated Wind Velocity - mph (km/hr)	150 (240)	200 (320)
Lateral Thrust @ 100 mph - lbs. (kg)	11.3 (5.13)	48 (21.7)
Bending Moment 1 in. (25 mm) Below Top of Support Pipe @ 100 mph - ft./lbs. (m/kg)	5.5 (.75)	47 (6.5)
Mounting Hardware - Supplied	PD89 Clamp Set	PD46 Clamp Set
Mounting Hardware - Optional	PD241 Wall Mt., PD246 Pole Mt. PD10002 Side Mount (Short)	
Shipping Weight - lbs. (kg)	9 (4.08)	20 (9.07)
Shipping Volume - ft.³ (m³)	.1 (.003)	.48 (.013)
Shipping Mode	UPS	UPS

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Fiberglass Collinear Antennas

PCN6 — **6 dBd Gain, Stationmaster™**

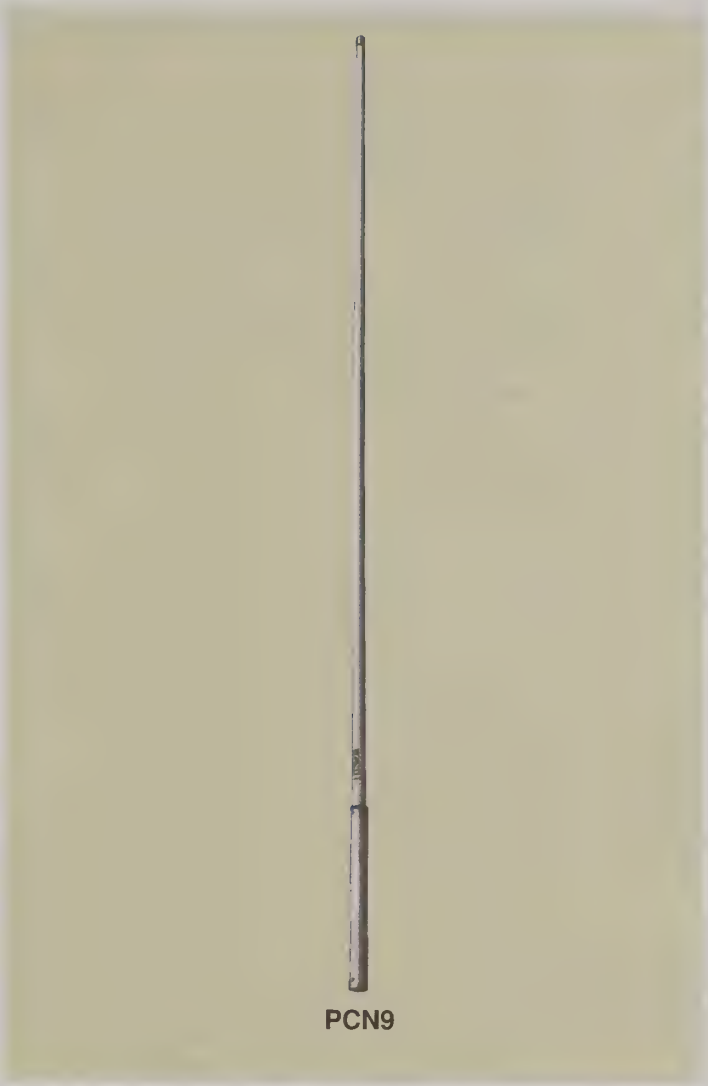
PCN9 — **9 dBd Gain, Stationmaster™**

*** Exact frequencies must be specified.**

The Stationmaster series of land mobile radio communications base station antennas is internationally known. Each consists of a number of collinear radiating copper elements fed in phase and enclosed in a weatherproof fiberglass housing. Each is designed for maximum strength with minimum cross section. Stationmaster antennas will withstand winds of up to 100 miles per hour. Each is equipped with a special low loss insulated connector at the base of the support pipe. These strong, lightweight antennas are ideally suited for use in multiple antenna installations.

The PCN6 and PCN9 are designed to cover both the narrowband PCN and the 900 MHz paging systems. The PCN6 provides medium gain and beamwidth while the PCN9 has high gain and narrow beamwidth.

- **Small diameter fiberglass construction** — Lightweight and reduced wind loads.
- **Copper radiating elements** — Minimized possibility of intermod generation.
- **Withstands 100 mph wind forces** — Assures system reliability.



PCN9

Ordering Information

Item Number	Frequency Range - MHz
PCN6-1	901-902
PCN6-2	928-941
PCN9-1	901-902
PCN9-2	928-941

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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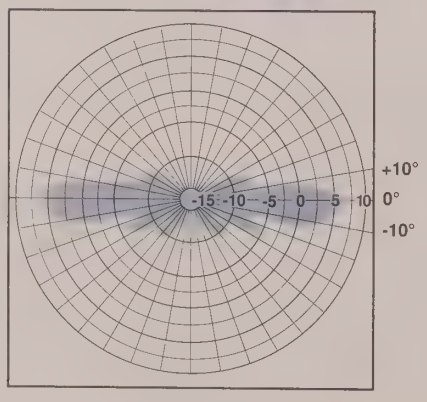
Fiberglass Collinear Antennas

ELECTRICAL SPECIFICATIONS	PCN6	PCN9
Downtilt	N/A	N/A
Gain - dBd	6	9
Bandwidth - MHz for 1.5:1 VSWR	7	5
Standard Bandwidths - MHz	901-902 / 928-941	901-902 / 928-941
Vertical Beamwidth 1/2 Power Points	16°	6°
Maximum Power Input - Watts	500	500
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Fixed	N-female	N-female
Flexible Extension - Supplied	18 in. (457mm) RG8A/U Flexible Cable w/ N-Male Connector Attached	

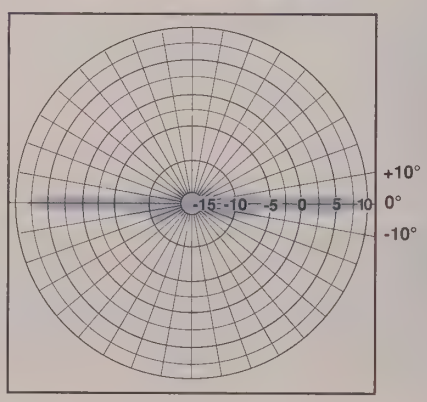
Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PCN6	PCN9
Overall Length - ft. (m)	6.3 (2.07)	12.8 (3.90)
Element Housing Length - ft. (m)	5.3 (1.74)	11 (3.35)
Support Pipe Diameter - in. (mm)	1-5/8 (41.3)	2-3/8 (60.3)
Support Pipe Mounting Length - in. (mm)	12 (305)	22 (559)
Weight - lbs. (kg)	8 (3.63)	17 (7.71)
Radiating Element Material	Copper Alloy	Copper Alloy
Element Housing Material	Fiberglass	Fiberglass
Support Pipe Material	6061-T6 Aluminum	6061-T6 Aluminum
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	0.46 (.02)	1.375 (.128)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	18.4 (8.4)	55 (25)
Bending Moment 1 in. (25 mm) Below Ground Plane @ 100 mph - ft./lbs. (m/kg)	40 (5.5)	300 (41.6)
Mounting Hardware - Supplied	PD46 Clamp Set	PD46 Clamp Set
Mounting Hardware - Optional	PD241 Wall Mount PD246 Pole Mount PD402 Side Mount (Short) PD403 Side Mount (Long)	PD241 Wall Mount PD246 Pole Mount PD302 Side Mount (Short) PD303 Side Mount (Long)
Shipping Weight - lbs. (kg)	20 (9.1)	37 (16)
Shipping Volume - ft.³ (m³)	.71 (.02)	1.8 (.05)
Shipping Mode	UPS	Common Carrier

VERTICAL PATTERN ☐ PCN6



VERTICAL PATTERN ☐ PCN9



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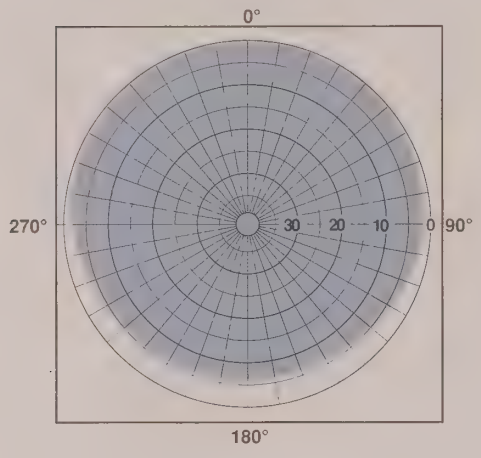
800 MHz Reflector Antennas

Listed below are the current 800 MHz antennas which utilize single or dual rod reflectors spaced either half-wavelength or quarter-wavelength behind the antenna. This configuration produces an offset type pattern. *Antennas may be invert mounted.*

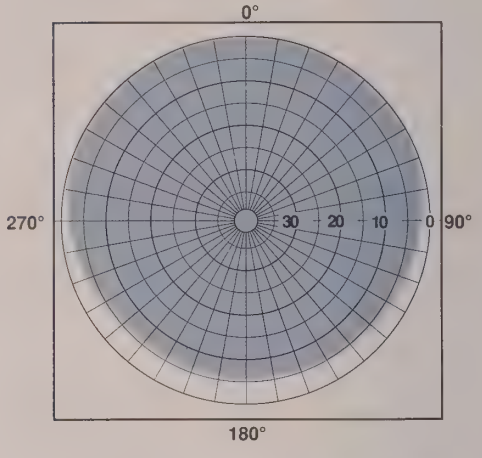
ORDERING NO.	DESCRIPTION	REFLECTOR	BANDWIDTH
10162-1A	PD1110-2	λ/4 Single	824-846.5
10162-1B	PD1110-2	λ/4 Single	835-849
10162-2A	PD1110-8	λ/4 Single	869-891.5
10162-2B	PD1110-8	λ/4 Single	880-894
10163-1A	PD1110-2	λ/2 Single	824-846.5
10163-1B	PD1110-2	λ/2 Single	835-849
10163-2A	PD1110-8	λ/2 Single	869-891.5
10163-2B	PD1110-8	λ/2 Single	880-894
10164-1A	PD10017-2	λ/4 Single	824-846.5
10164-1B	PD10017-2	λ/4 Single	835-849
10164-2A	PD10017-5	λ/4 Single	869-891.5
10164-2B	PD10017-5	λ/4 Single	880-894
10165-1A	PD10017-2	λ/2 Single	824-846.5
10165-1B	PD10017-2	λ/2 Single	835-849
10165-2A	PD10017-5	λ/2 Single	869-891.5
10165-2B	PD10017-5	λ/2 Single	880-894
10166-1A	PD1109E	λ/4 Single	824-846.5
10166-1B	PD1109E	λ/4 Single	835-849
10166-2A	PD1109E	λ/4 Single	869-891.5
10166-2B	PD1109E	λ/4 Single	880-894
10168-1A	PD1110-2	λ/4 Dual	824-846.5
10168-1B	PD1110-2	λ/4 Dual	835-849
10168-2A	PD1110-8	λ/4 Dual	869-891.5
10168-2B	PD1110-8	λ/4 Dual	880-894
10170-1A	PD10017-2	λ/4 Dual	824-846.5
10170-1B	PD10017-2	λ/4 Dual	835-849
10170-2A	PD10017-5	λ/4 Dual	869-891.5
10170-2B	PD10017-5	λ/4 Dual	880-894
10172-1A	PD1109E	λ/4 Dual	824-846.5
10172-1B	PD1109E	λ/4 Dual	835-849
10172-2A	PD1109E	λ/4 Dual	869-891.5
10172-2B	PD1109E	λ/4 Dual	880-894

800 MHz Reflector Antennas

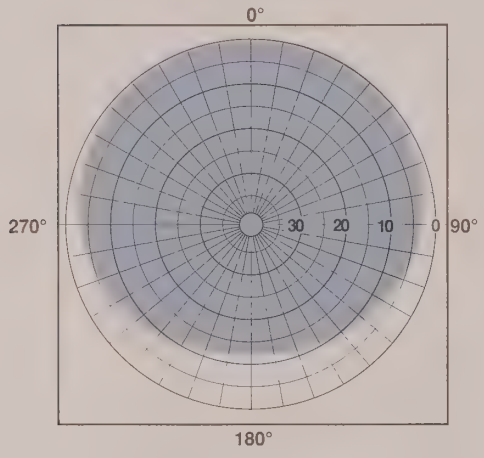
Horizontal pattern PD1110 with single reflector assembly. Spaced λ /4.



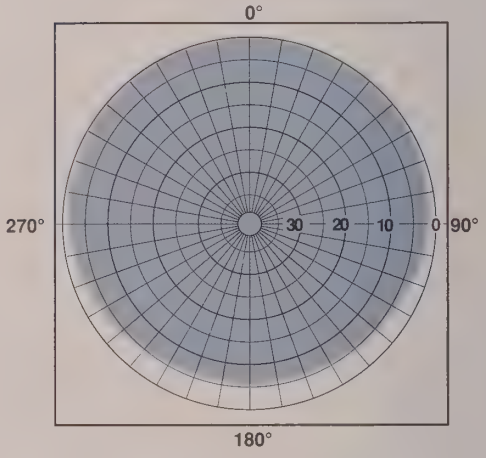
Horizontal pattern PD1109 with single reflector assembly. Spaced λ /4.



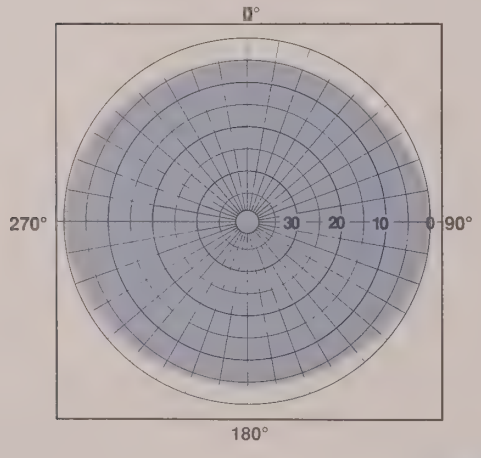
Horizontal pattern PD1110 with dual reflector assembly. Spaced λ /4.



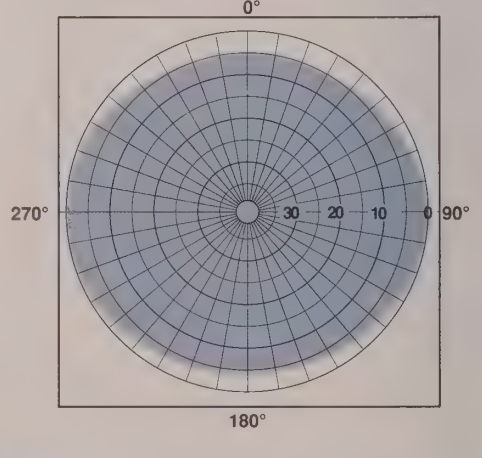
Horizontal pattern PD10017 with single reflector assembly. Spaced λ /4.



Horizontal pattern PD1110 with single reflector assembly mounted λ /2 from 1/2" rod.



Horizontal pattern PD10017 with single reflector assembly mounted λ /2 from 1/2" rod.



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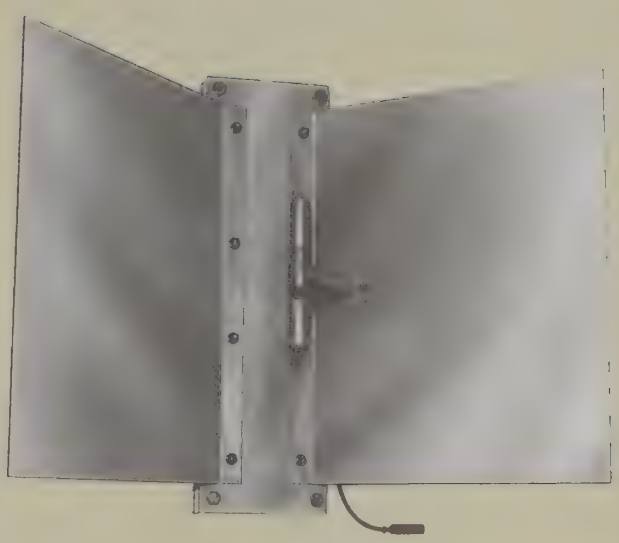
Corner Reflector Antennas

PD10040 **8.0 dBd Gain**
PD1124 **9.0 dBd Gain**

These Corner Reflector Antennas were designed for use in the 806-960 MHz band. Both utilize a broadband radiating element capable of operating over an 80 MHz bandwidth with a maximum VSWR of 1.5:1. Standard available bandwidths are: 806-896 MHz and 880-960 MHz. A choice of horizontal beamwidths is offered: the PD10040 at 60° and the PD1124 at 46°.

The radiating element and reflector are made of high strength aluminum alloy, irridited to minimize corrosion. The high gain and wide band characteristics of these antennas make them particularly suitable for use in control station-to-repeater link applications.

- **Broadband design** Allows duplex operation.
- **Irridited reflector and radiating element** Minimizes corrosion.
- **High front to back ratio** Provides isolation from adjacent systems.



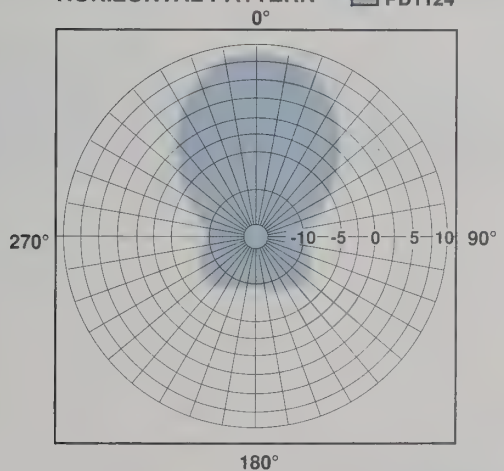
PD1124

COMPLIES WITH EIA 329 STANDARD

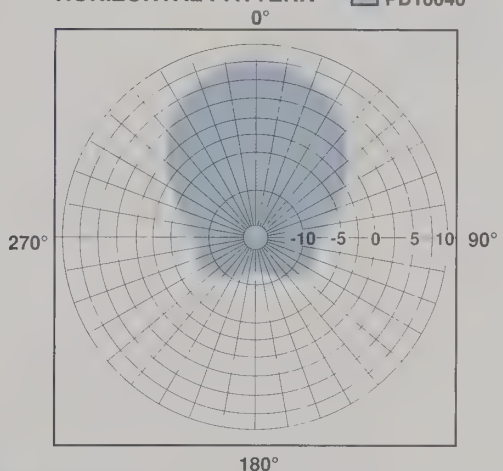
Ordering Information

Item Number	Frequency Range - MHz
PD10040-1	806-896
PD10040-2	880-960
PD1124-1	806-896
PD1124-2	880-960

HORIZONTAL PATTERN ☐ PD1124



HORIZONTAL PATTERN ☐ PD10040



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Corner Reflector Antennas

ELECTRICAL SPECIFICATIONS	PD1124	PD10040
Frequency Range - MHz	806-960	806-960
Gain - dBd	9.0	8.0
Bandwidth - MHz for 1.5:1 VSWR	80 or 90	80 or 90
Horizontal Beamwidth 1/2 Power Points	46°	60°
Vertical Beamwidth 1/2 Power Points	54°	54°
Maximum Power Input - Watts	100	100
Front-to-Back Ratio - dBd	25	20
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Fixed	N-female	N-female
Flexible Extension - Supplied	18 in. (457 mm) RG214/U Flexible Cable with N-male Connectors Attached	

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD1124	PD10040
Reflector Size (Per Side) @ 850 MHz		
Width - in. (mm)	13 (330)	9.5 (241)
Height - in. (mm)	16 (406)	16 (406)
Weight - lbs. (kg)	11 (5.0)	10 (4.5)
Radiating Element Material	6061-T6 Aluminum Alloy	6061-T6 Aluminum Alloy
Reflector Material	5052-H32 Aluminum Alloy	5052-H32 Aluminum Alloy
Wind Loading Area @ 806 MHz Flat Plate Equivalent - $ft.^2$ (m^2)	2.63 (.244)	1.83 (.170)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)
Lateral Thrust @100 mph @ 806 MHz - lbs. (kg)	105 (47.7)	73 (33.2)
Torsional Moment @ 100 mph with Standard Mounting - ft./lbs. (m/kg)	29 (4.02)	14 (1.94)
Mounting Hardware - Supplied	PD1253 Clamp Set to fit 1-5/16 in. (33 mm) to 2-3/8 in. (60 mm) Diameter Pipe	
Shipping Weight - lbs. (kg)	17 (8)	16 (7.3)
Shipping Volume - $ft.^3$ (m^3)	1.4 (.04)	1.3 (.037)
Shipping Mode	UPS	UPS

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Wideband 37° Sector Antennas

AP863712 (previously PD10193) **12.2 dBd Gain AMPS/TACS**

AP863715 (previously PD10194) **15.2 dBd Gain AMPS/TACS**

These 37° directional panel antennas are designed for low density, three sector AMPS/TACS cell sites.

Their high front-to-back ratio effectively isolates interference from adjacent cells and is nearly impervious to tower changes. In addition, their enclosed design makes them less subject to damage from low amplitude and proximity lightning strikes. The wide bandwidth allows for their use for TX, RX and Full Duplex applications.

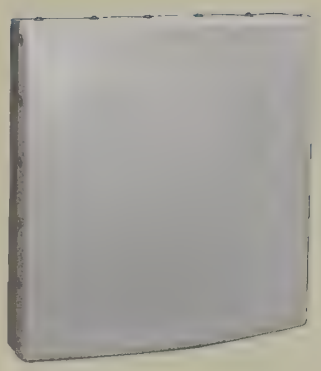
The radiating elements are enclosed in a high impact, UV stabilized radome to protect from environmental hazards. All aluminum alloy components; stainless steel screws are double secured to eliminate non-linear joints.

- **High front-to-back ratio** — Isolates interference from adjacent cells.
- **Wide bandwidth** — Allows for TX, RX and Full Duplex applications
- **Enclosed design** — Less subject to damage from low amplitude and proximity lightning strikes.

Ordering Information

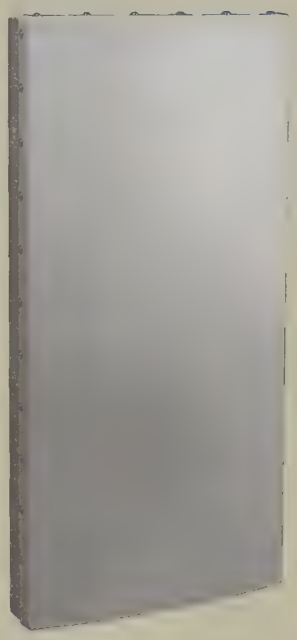
Item Number	Frequency Range - MHz
AP863712	820-900
AP863715	820-900

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.



AP863712

COMPLIES WITH EIA 329 STANDARD



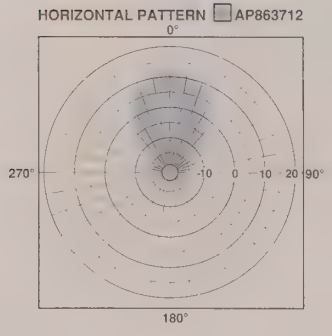
AP863715

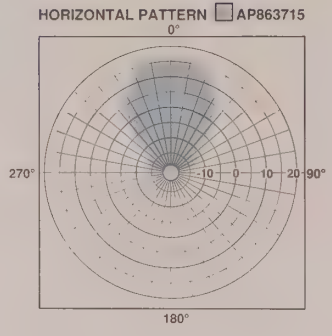
Wideband 37° Sector Antennas

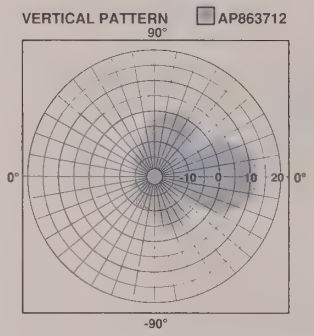
ELECTRICAL SPECIFICATIONS	AP863712	AP863715
Frequency Range - MHz	820-900	820-900
Gain - dBd	12.2	15.2
Bandwidth - MHz for 1.5:1 VSWR*	80	80
Horizontal Beamwidth at 1/2 Power Points	37°	37°
Vertical Beamwidth at 1/2 Power Points	32°	15.5°
Maximum Power Input - Watts	500	500
Front-to-Back Ratio - dBd	30 (35 Typical)	30 (35 Typical)
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct Fixed	N-female	N-female

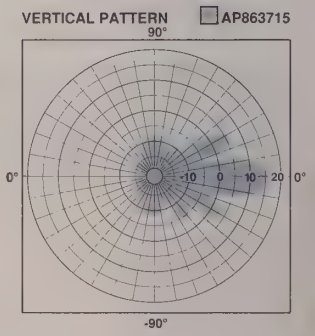
Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	AP863712	AP863715
Width - in. (mm)	21 (533)	21 (533)
Height - in. (mm)	21 (533)	42.5 (1079)
Depth - in. (mm)	5 (127)	5 (127)
Weight - lbs. (kg)	19 (8.6)	45 (20.4)
Radiating Element Material	Aluminum Alloy	
Radome Material	UV Stabilized High Impact ABS Plastic	
Reflector Material	5052-H32 Aluminum	
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	3.06 (.284)	6.2 (.576)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	122.5 (55.6)	248 (112.5)
Torsional Moment @ 100 mph with Standard Mounting - ft. lbs. (mk/g)	15.75 (2.18)	31.9 (4.41)
Mounting Hardware - Standard	PD10238-1 Clamp Set	
Downtilt Mount-Option	Retrofit Kit PD10238-1R	
	PD10238-1 and PD 10228-1	PD10238-1 and PD10228-2
Shipping Weight - lbs. (kg)	40 (18.1)	60 (27.2)
Shipping Volume - ft.³ (m³)	5.3 (.15)	9.8 (.28)
Shipping Mode	UPS	UPS









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60° Sector Antenna

AP886007 (Previously PD10186) 7.0 dBd Gain

Celwave's AP886007 antenna features a high front to back ratio to ensure effective isolation from adjacent and co-channel interference in a cellular system. The pattern is nearly impervious to tower changes.

The enclosed design makes it less susceptible to damage from low amplitude and proximity lightning strikes. The elements are almost completely shielded within the grounded reflector.
A weather-resistant radome protects the antenna radiating element and feed point from icing, salt air, and acid rain.

This panel antenna may be mounted back-to-back to provide dual system omni-coverage at the same tower elevation with only 30% more wind loading than one array.

- **High front-to-back ratio** — Isolates from co-channel and adjacent sites.
- **Unobtrusive** — Blends in with architecture; can be painted to match surface.*
- **ABS radome** — Protects radiating element and feed point from the environment.
- **Enclosed design** — Protects against low amplitude and proximity lightning strikes.

*Contact our Sales Engineering department for painting instructions.

AP886007

Patents Pending

Ordering Information

Item Number	Frequency Range - MHz
AP886007	806-960

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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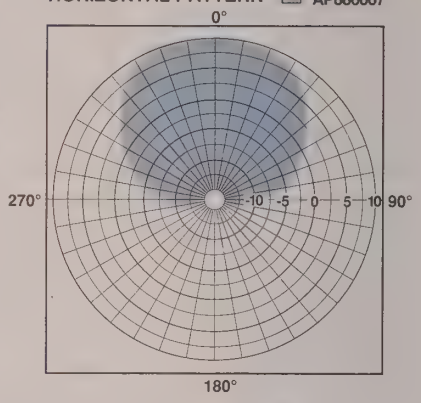
60° Sector Antenna

ELECTRICAL SPECIFICATIONS	AP886007
Frequency Range - MHz	806-960
Gain - dBd	7.0
Bandwidth - MHz for 1.5:1 VSWR*	154
Horizontal Beamwidth 1/2 Power Points	62°
Vertical Beamwidth 1/2 Power Points	60°
Maximum Power Input - Watts	500
Front-to-Back Ratio - dBd	30 (35 Typical)
Lightning Protection	Direct Ground
Termination - Direct Fixed Option	N-female 7/16 DIN

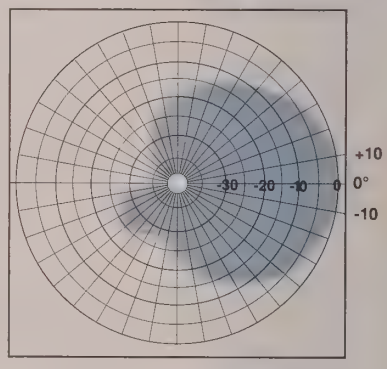
Note: All VSWR data referenced to 50 Ohms.

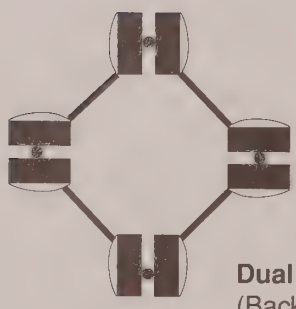
MECHANICAL SPECIFICATIONS	AP886007
Width - in. (mm)	10-3/8 (264)
Height - in. (mm)	11-3/4 (298)
Depth - in. (mm)	5 (127)
Weight - lbs. (kg)	7 (3.2)
Radiating Element Material	Aluminum Alloy (Irridited)
Radome Material	Weather Resistant Plastic
Reflector Material	5052-H32 Aluminum (Irridited)
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	0.85 (0.08)
Rated Wind Velocity - mph (km/hr)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	34 (15.4)
Torsional Moment @ 100 mph with Standard Mounting - ft. lbs. (mk/g)	6.8 (.94)
Mounting Hardware - Supplied	PD10238
Shipping Weight - lbs. (kg)	12 (5.4)
Shipping Volume - ft.³ (m³)	1 (.03)
Shipping Mode	UPS

HORIZONTAL PATTERN ☐ AP886007

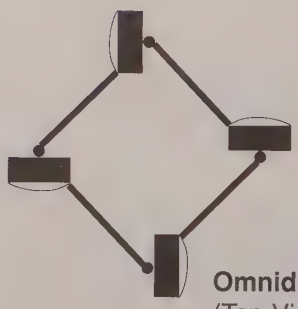


VERTICAL PATTERN ☐ AP886007





Dual System
(Back to Back)



Omnidirectional Array
(Top View)

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Wideband 60° Sector Antenna

AP866017 (previously PD10219-2S)**17 dBd Gain**
AP926017 (previously PD10219-3S)**17 dBd Gain**
AP916017 (previously PD10219-4S)**17 dBd Gain**

These 17 dBd gain, 62 degree directional panel antennas are designed to meet various sector coverage requirements for mobile radio service in the 824-960 MHz range. This design features side-fed dipoles and a low-loss stripline feed system. All components are aluminum alloy; stainless steel screws are double secured to eliminate non-linear joints. A high impact, low-loss radome protects the radiating elements from ice, rain and caustic environments. *Option "H" includes 138 inch aluminum support pipe.*

- **Low profile** — Architecturally pleasing, may be painted to blend with building.*
- **Weathertight radome** — Protects elements and feed system from hostile environment minimizes pattern distortion due to ice build up.
- **One piece construction** — Easy to install.
- **High front-to-back ratio** — Isolates from co-channel and adjacent sites.

*Contact our Sales Engineering department for painting instructions.

Ordering Information

Item Number	Frequency Range - MHz
AP866017	824-894
AP926017	890-960
AP916017	872-950

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

AP866017

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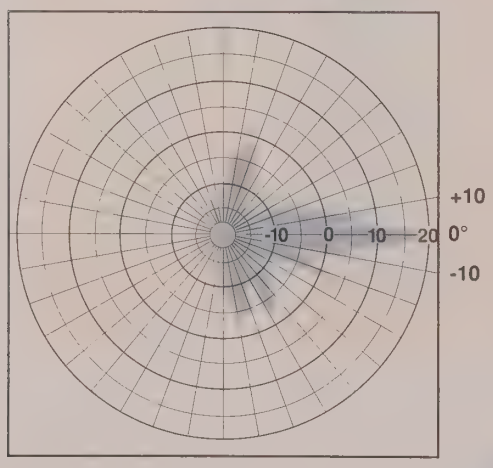
Wideband 60° Sector Antenna

ELECTRICAL SPECIFICATIONS	AP866017	AP926017	AP916017
Frequency Range - MHz	824-894	890-960	872-950
Gain - dBd	17	17	17
Bandwidth - MHz for 1.5:1 VSWR	70	70	78
Horizontal Beamwidth - Degrees	62	62	62
Vertical Beamwidth - Degrees	6	6	6
Power Input - Watts	500	500	500
Front-to-Back Ratio - dBd	30	30	30
Lightning Protection		Direct Ground	
Termination - Direct Fixed		N-Female	
Flexible Extension	None	Supplied with Option H only	None

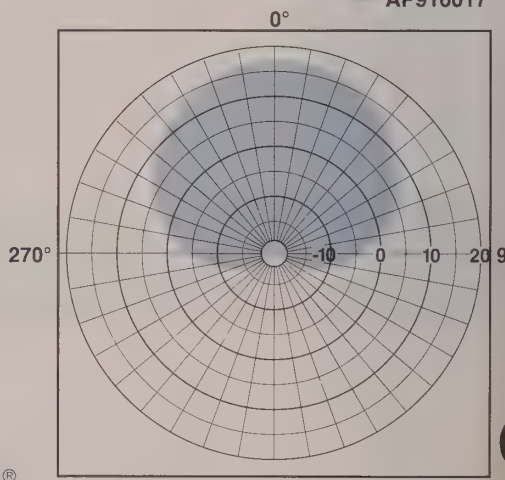
Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	AP866017	AP926017	AP916017
Overall Length - in. (mm)	135.0 (3429)	125.75 (3194)	128.0 (3251)
Antenna Width - in. (mm)	10.375 (263.5)	10.375 (263.5)	10.375 (263.5)
Antenna Depth - in. (mm)	4.5 (114.3)	4.5 (114.3)	4.5 (114.3)
Radiating Element Material		Aluminum Alloy	
Radome Material		ABS Plastic	
Reflector Material		5052-H32 Aluminum	
Support Pipe Material		6061-T6 Aluminum	
Support Pipe* Length - in. (mm)	N/A	138 (3505)	N/A
Wind Loading Area Flat Plate Equivalent - ft.² (m²)	9.37 (.87)	8.73 (.81)	9.22 (.86)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)	100 (161)
Lateral Thrust @ 100 mph Wind - lbs. (kg)	375 (170)	349 (158.3)	369 (167)
Torsional Moment @ 100 mph Wind with Standard Mounting Pipe - ft. lbs. (mk/g)	70.3 (9.72)	65.5 (9.06)	66.7 (9.21)
Antenna Weight w/Pipe - lbs. (kg)	N/A	60 (27.2)	N/A
Antenna Weight w/o Pipe - lbs. (kg)	48.5 (21.9)	45.5 (20.48)	45.5 (20.48)
Mounting Hardware - Supplied * Option H		PD10238 Clamp Set Special Mounting Clamp Supplied with 2.375 in. dia. (60.3 mm) 138" Support Pipe and PD46 Clamp Set	

VERTICAL PATTERN ☐ AP866017 AP926017 AP916017



HORIZONTAL PATTERN ☐ AP866017 AP926017 AP916017



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CELlite® 65° Directional Panel Antennas

AP906510 **10 dBd Gain**
AP906513 **13 dBd Gain**
AP906516 **16 dBd Gain**

These CELlite antennas are designed for applications in the AMPS, NAMPS, TACS, ETACS, NMT, GSM and EGSM cellular radio systems in the 824 to 960 MHz band. The antennas are manufactured with premium quality materials to ensure superior performance. The microstripline feed system consists of monolithic aluminum construction allowing for minimal welded joints to reduce the possibility of intermodulation problems. Each antenna features a lightweight, one piece, panel construction for ease of installation, reducing handling cost. All aluminum components are treated to minimize corrosion, assuring reliable operation in icing, salt air and rain conditions.

- **Broadband** — One antenna covers the entire band
- **Monolithic construction** — Reduces IM
- **UV stabilized radome** — Protects radiating elements from hostile environments
- **Surface treated components** — To prevent galvanic corrosion
- **High front-to-back ratio** — Ensures effective isolation from adjacent systems.

Ordering Information

Item Number	Mounting Hardware Included	Mounting Pipe Dia.
AP9065XX-1	Downtilt APM1-1	2-3.5"
AP9065XX-2	Downtilt APM2-1	2-3.5"
AP9065XX-3	Fixed Mt. U-clamp Set APM3-1	2-3.5"
AP9065XX-4	Fixed Mt. Clamp Set APM4-1	1.5-7.87"

AP906510

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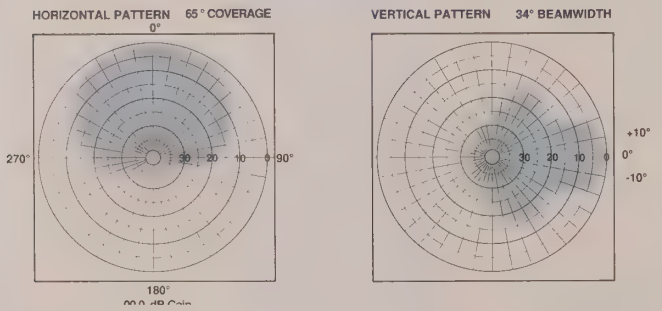
CELlite® 65° Directional Panel Antennas

ELECTRICAL SPECIFICATIONS	AP906510	AP906513	AP906516
Frequency Range - MHz	824-960	824-960	824-960
Gain min. - dBd/dBi	10/12	13/15	16/18
Bandwidth - MHz for 1.5:1 VSWR*	136	136	136
Horizontal Beamwidth - Degrees	65	65	65
Vertical Beamwidth - Degrees	34	17	8.5
Polarization		Vertical	
Power, Max.- Watts	1000	1000	1000
Front-to-Back Ratio - dB	25 (typ. 30)	30 (typ. 30)	30 (typ. 30)
Lightning Protection		Direct Ground	
Connector Type - Fixed Option		7/16 DIN Female Type-N	
3rd Order IMD at 2 x 49 dBm - dBc		< -150	

Note: All VSWR data referenced to 50 Ohms.
* VSWR 1.3:1 (869-960 MHZ)

MECHANICAL SPECIFICATIONS	AP906510	AP906513	AP906516
Dimensions - WxDxH - in. mm.	10.4 x 5.1 x 24 265 x 130 x 600	10.4 x 5.1 x 39 265 x 130 x 987	10.4 x 5.1 x 78 265 x 130 x 1977
Weight - (excl. mtng. hdwre.) - lbs.(kg)	7.05(3.25)	12.12(5.5)	25.35(11.5)
Weight - Mounting Hardware - lbs. (kg)	.441(.20)(APM4-1)	6.8(3.1)(APM2-1)	6.8(3.1)(APM2-1)
Radiating Element Material		Aluminum (AlMg3)	
Radome Material		UV-Resistant	
Wind Loading Area - ft.² (m²)	1.61(.150)	2.71(.252)	5.42(.504)
Rated Wind Velocity - mph (km/hr)	125(200)	125(200)	125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	92.2(41.8)	158.8(72.0)	345.4(156.7)
Mounting Hardware - Supplied		Hot Galvanized Steel	

AP906510



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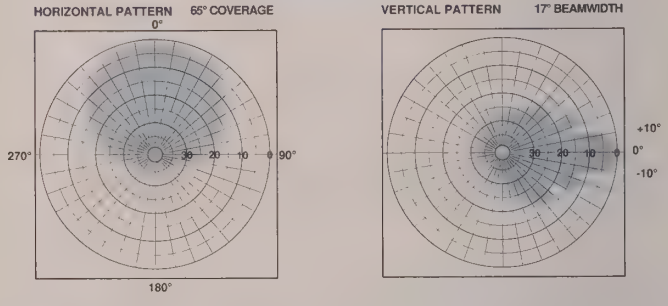

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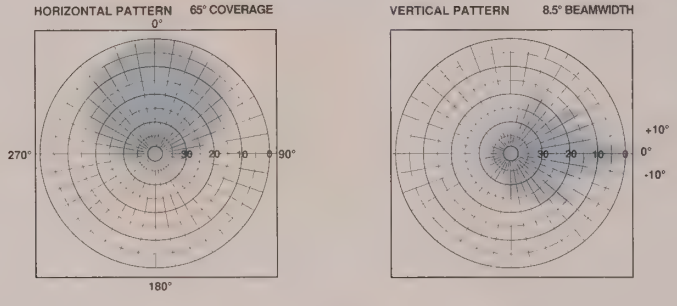

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2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

CELlite® 90° Directional Panel Antennas

AP909009 **8.5 dBd Gain**
AP909011 **11 dBd Gain**
AP909014 **13.5 dBd Gain**

These CELlite antennas are designed for applications in the AMPS, NAMPS, TACS, ETACS, NMT, GSM and EGSM cellular radio systems in the 824 to 960 MHz frequency band. The antennas are manufactured with premium quality materials to ensure superior performance. The microstripline feed system consists of monolithic aluminum construction allowing for minimal welded joints to reduce the possibility of intermodulation problems. Each antenna features a lightweight, one piece, panel construction for ease of installation, reducing handling cost. All aluminum components are treated to minimize corrosion, assuring reliable operation in icing, salt air and rain conditions.

- **Broadband** — One antenna covers the entire band
- **Monolithic construction** — Reduces IM
- **UV stabilized radome** — Protects radiating elements from hostile environments.
- **Surface treated components** — To prevent galvanic corrosions
- **High front-to-back ratio** — Ensures effective isolation from adjacent systems

AP909009

Ordering Information

Item Number	Mounting Hardware Included	Mounting Pipe Dia.
AP9090xx-1	Downtilt APM1-1	2-3.5"
AP9090xx-2	Downtilt APM2-2	2-3.5"
AP9090xx-3	Fixed Mt. U-clamp APM3-1	2-3.5"
AP9090xx-4	Fixed Mt. Clamp Set APM4-1	1.5-7.87"

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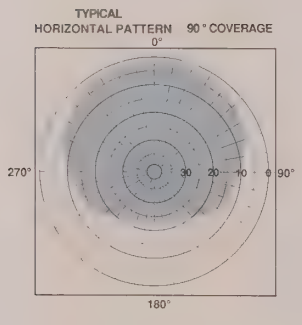
CELlite® 90° Directional Panel Antennas

ELECTRICAL SPECIFICATIONS	AP909009	AP909011	AP909014
Frequency Range - MHz	824-960	824-960	824-960
Gain min. - dBd/dBi	8.5/11	11/14	13.5/16
Bandwidth - MHz for 1.5:1 VSWR*	136	136	136
Horizontal Beamwidth - Degrees	90	90	90
Vertical Beamwidth - Degrees	35	17.5	8.5
Polarization		Vertical	
Power, Max.- Watts	1000	1000	1000
Front-to-Back Ratio - dB	>25	>25	>25
Lightning Protection		Direct Ground	
Connector Type - Standard Option		7/16 DIN Female Type-N	
3rd Order IMD at 2 x 49 dBm - dBc		< -150	

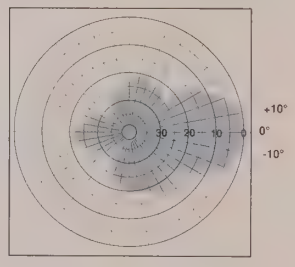
Note: All VSWR data referenced to 50 Ohms.

* VSWR 1.3:1 (869-960 MHZ)

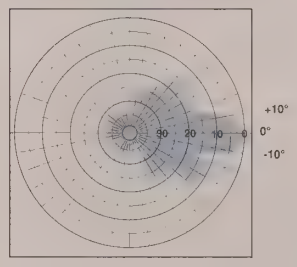
MECHANICAL SPECIFICATIONS	AP909009	AP909011	AP909014
Dimensions - WxDxH - in. mm.	10.4 x 5.1 x 24 265 x 130 x 600	10.4 x 5.1 x 39 265 x 130 x 987	10.4 x 5.1 x 78 265 x 130 x 1977
Weight - (excl. mtng. hdwre.) - lbs.(kg)	5.5(2.5)	10.8(4.9)	20.95(9.5)
Weight - Mounting Hardware - lbs. (kg)	.441(0.2) (APM4-1)	6.8(3.1) (APM2-1)	6.8(3.1) (APM2-1)
Radiating Element Material		Aluminum (AlMg3)	
Radome Material		UV-Resistant - ASA	
Wind Loading Area - ft.² (m²)	1.61(.150)	2.71(.252)	5.42(.504)
Rated Wind Velocity - mph (km/hr)	125(200)	125(200)	125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	92.2(41.8)	158.8(72.0)	345.4(156.7)
Mounting Hardware - Supplied		Hot Galvanized Steel	



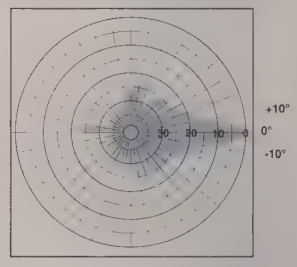
AP909009



AP909011



AP909014



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2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

Wideband 100° Sector Antenna

AP861011 (previously PD10236) **11 dBd Gain**

The AP861011 is an 11 dBd gain, 100 degree sector antenna designed for low density, three sector AMPS/TACS cell sites where AMPS/TACS/GSM systems are combined into a single antenna. The wide bandwidth allows for Tx, Rx and full duplex operations in the 820-900 MHz range. The AP861011 is 48-1/2 inches long, 7-5/8 inches wide, 5 inches deep and weighs 10 pounds. Additionally, this antenna offers a 20 dBd front-to-back ratio, 500 Watt power input, 1.5:1 VSWR, side fed dipole design and low loss air dielectric stripline feed. The radome is constructed of a low loss, high impact UV stabilized plastic to protect the radiating elements from environmental hazards. All aluminum alloy components; stainless steel screws are double secured to eliminate non-linear joints.

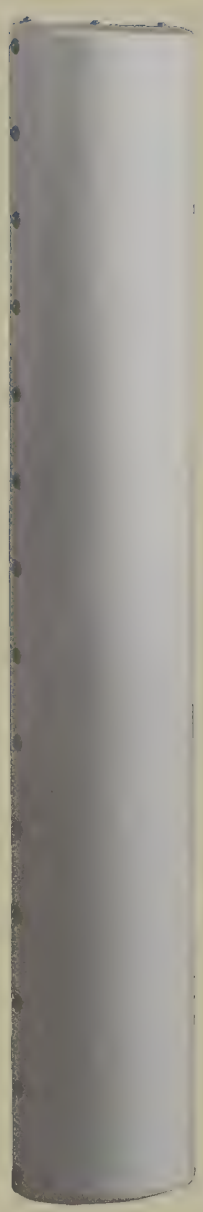
- **High front-to-back ratio** — Isolates from co-channel and adjacent sites.
- **Slim profile** — Aesthetically pleasing, can be painted to blend with architecture.*
- **Weathertight radome** — Protects radiating elements from environmental hazards and minimizes pattern distortion due to ice build-up.

*Contact our Sales Engineering department for painting instructions.

Ordering Information

Item Number	Frequency Range - MHz
AP861011	820-900

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.



AP861011

COMPLIES WITH EIA 329 STANDARD

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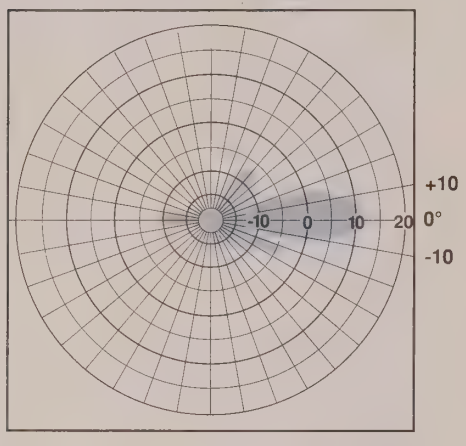
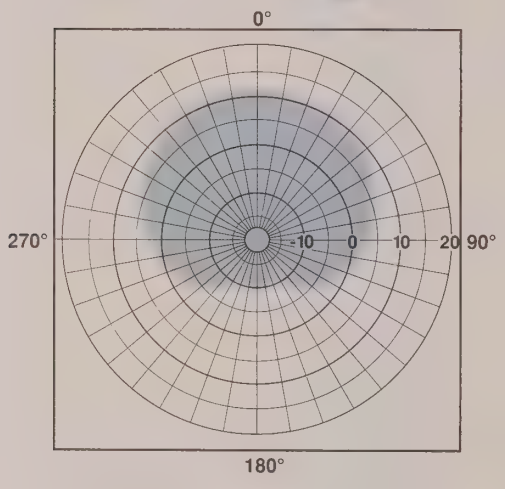
Wideband 100° Sector Antenna

VERTICAL PATTERN ☐ AP861011



HORIZONTAL PATTERN ☐ AP861011



ELECTRICAL SPECIFICATIONS	AP861011
Frequency Range - MHz	820-900
Gain - dBd	11
Bandwidth - MHz for 1.5:1 VSWR	80
Horizontal Beamwidth 1/2 Power Points	100°
Vertical Beamwidth 1/2 Power Points	15.8°
Maximum Power Input - Watts	500
Front-To-Back Ratio - dBd	20
Lighting Protection	Direct Ground
Termination - Direct	N-female

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	AP861011
Width - in. (mm)	7.625 (194)
Height - in. (mm)	48.5 (1232)
Depth - in. (mm)	5.0 (127)
Weight - lbs. (kg)	10 (4.52)
Radiating Element Material	Aluminum Alloy
Radome Material	UV Stabilized High Impact ABS Plastic
Reflector Material	5052-H32 Aluminum
Wind Loading Area Flat Plate Equivalent - ft.² (m^2)	1.69 (157)
Rated Wind Velocity - mph (km/hr)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	67.6 (30.2)
Torsional Moment @ 100 mph w/std. Mounting - ft.lbs (mkg)	15.87 (2.19)
Mounting Hardware - Supplied	PD10238-2 Clamp Set
Mechanical Downtilt Bracket - Option	Retrofit Kit PD10238-2R Scissor Kit PD10228-2
Shipping Mode	UPS

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Wideband 100° Sector Antenna

AP861014 (previously PD10246) **14 dBd Gain**

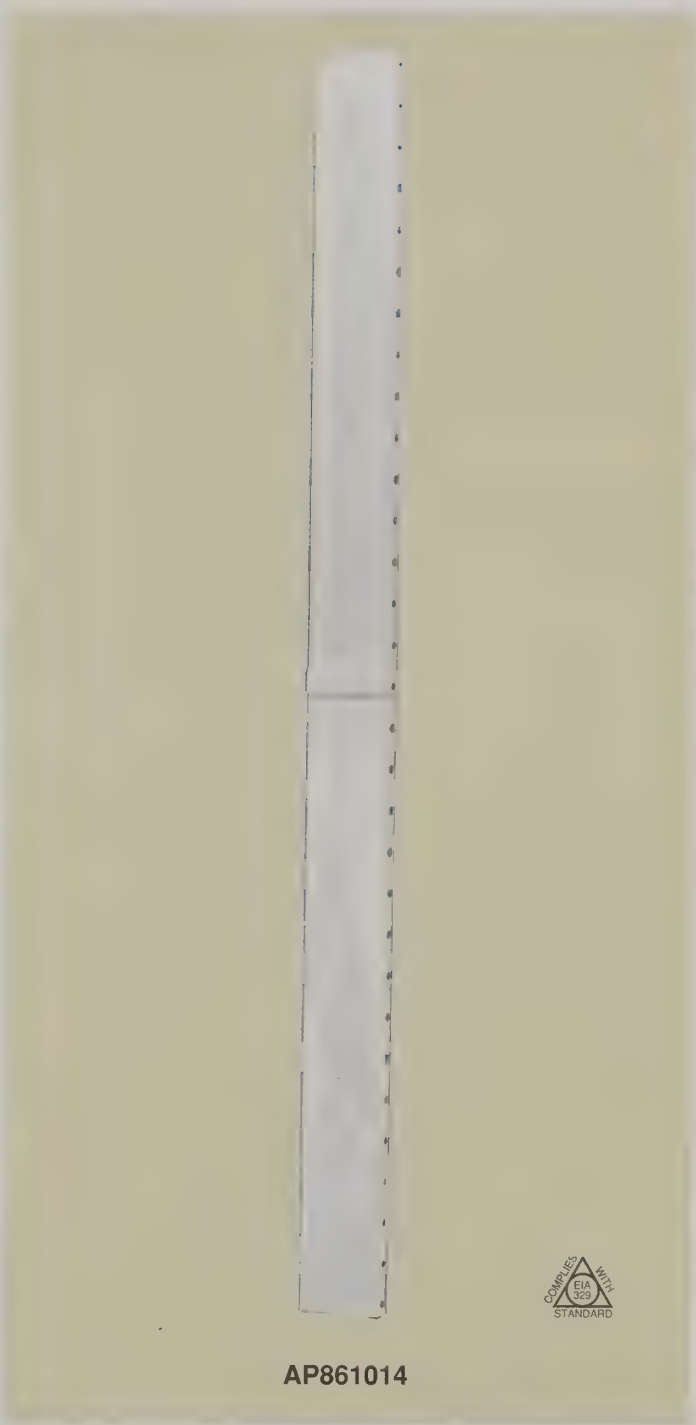
The AP861014 is a 14 dBd gain, 100° directional sector antenna designed for low density, three AMPS/TACS cell sites. Its wide bandwidth allows for Tx, Rx and full duplex operations in the 820-900 MHz range. This vertically stacked array is constructed in a one piece panel reflector, and is supplied with three PD10238-4 mounting clamps. This antenna features a two piece radome that compensates for differential expansion due to temperature variations. The input connector is coupled directly to the antenna's internal radiating system. There are no internal cables, external power dividers nor external cable harnesses, resulting in a single input connector design. This results in negligible feed system losses and minimum-one-connector IM exposure. In addition, this antenna offers a 6.3° vertical beamwidth, 20 dB front to back ratio, and a 500 Watt power input. An optional PD10228-6 scissor kit is available to provide mechanical downtilt.

- **Slim Profile** — Aesthetically pleasing, may be painted to blend with building.*
- **One Piece Reflector Panel** — Easy to install.
- **High front to back ratio** — Isolates from co-channel. and adjacent sites.
- **No Internal Cables** — Resulting negligible feed system losses.
- **Single Connector Feed System** — Minimum one-connector IM exposure.

*Contact Sales Engineering for painting instructions.

Ordering Information

Item Number	Frequency Range - MHz
AP861014	820-900 MHz



AP861014

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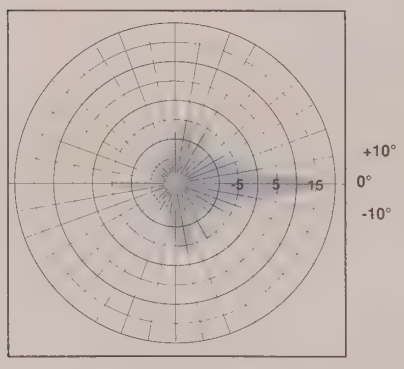
Wideband 100° Sector Antennas

ELECTRICAL SPECIFICATIONS	AP861014
Frequency Range - MHz	820-900
Gain - dBd	14
Bandwidth - MHz	70
Horizontal Beamwidth at 1/2 Power Points	100°
Vertical Beamwidth at 1/2 Power Points	6.3°
Power Input - Watts	500
Front-to-Back Ratio - dB	20
Lightning Protection	Direct Ground
Termination - Direct Fixed Optional Input*	N-Female EIA, 7/16 DIN Connector

**Input 1000 Watts Capability Rating*

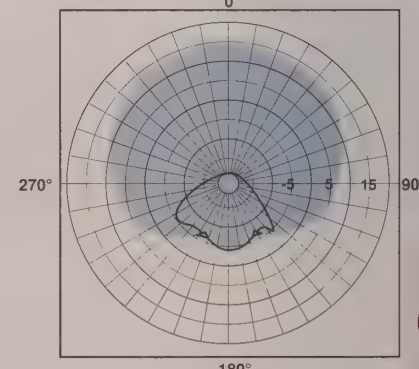
MECHANICAL SPECIFICATIONS	AP861014
Height - in. (mm)	110(2794)
Width - in. (mm)	7.625(194)
Depth - in. (mm)	5.0(127)
Weight- lbs. (kg)	40(18.2)
Radiating Element Material	Aluminum Alloy
Radome Material	UV Stabilized High Impact ABS Plastic
Reflector Material	5052-H32 Aluminum Alloy
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	3.88 (.360)
Rated Wind Velocity - mph (km/hr)	100 (161)
Lateral Thrust @ 100 mph winds - lbs. (kg)	155.4 (70.5)
Torsional Moment @ 100 mph with Standard Mounting - ft. lbs. (mk/g)	36.0 (4.98)
Mounting Hardware - Supplied Optional Mechanical Downtilt	PD10238-4 Bracket PD10228-6
Shipping Weight - lbs. (kg)	70(31.8)
Shipping Volume - ft.^{3} (m^3)	12.63(.358)
Shipping Mode	Common Carrier

VERTICAL PATTERN 6.3 ° BEAMWIDTH



Antenna Gain - 14.4 dBd

HORIZONTAL PATTERN 100 ° COVERAGE



Antenna Gain - 14.4 dBd

CELWAVE®
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CELlite® 105° Directional Panel Antennas

AP901008 **8 dBd Gain**
AP901011 **10.5 dBd Gain**
AP901013 **13 dBd Gain**

These CELlite antennas are designed for applications in the AMPS, NAMPS, TACS, ETACS, NMT, GSM and EGSM cellular radio systems in the 824 to 960 MHz frequency band. The antennas are manufactured with premium quality materials to ensure superior performance. The microstripline feed system consists of monolithic aluminum construction allowing for minimal welded joints to reduce the possibility of intermodulation problems. Each antenna features a lightweight, one piece, panel construction for ease of installation, reducing handling cost. All aluminum components are treated to minimize corrosion, assuring reliable operation in icing, salt air and rain conditions.

- **Broadband** — One antenna covers the entire band
- **Monolithic construction** — Reduces IM
- **UV stabilized radome** — Protects radiating elements from hostile environments.
- **Surface treated components** — To prevent galvanic corrosions
- **High front-to-back ratio** — Ensures effective isolation from adjacent systems

Ordering Information

Item Number	Mounting Hardware Included	Mounting Pipe Dia.
AP9010XX-1	Downtilt APM1-1	2-3.5"
AP9010XX-2	Downtilt APM2-1	2-3.5"
AP9010XX-3	Fixed Mt. U-clamp Set APM3-1	2-3.5"
AP9010XX-4	Fixed Mt. Clamp Set APM4-1	1.5-7.87"

AP901008

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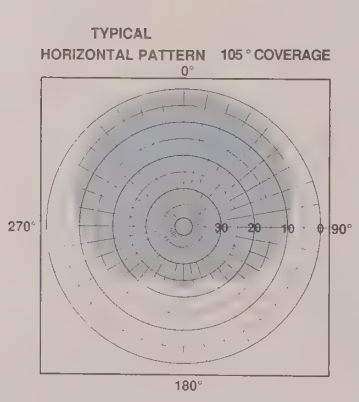
CELlite® 105° Directional Panel Antennas

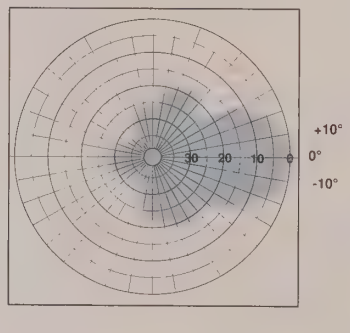
ELECTRICAL SPECIFICATIONS	AP901008	AP901011	AP901013
Frequency Range - MHz	824-960	824-960	824-960
Gain min. - dBd/(dBi)	8/10	10.5/13	13/16
Bandwidth - MHz for > 1.3:1 VSWR*	136	136	136
Horizontal Beamwidth - Degrees	105	105	105
Vertical Beamwidth - Degrees	35	17.5	8.5
Polarization		Vertical	
Power, Max.- Watts	1000	1000	1000
Front-to-Back Ratio - dB	>23	>23	>23
Lightning Protection		Direct Ground	
Connector Type - Standard Option		7/16 DIN Female Type-N	
3rd Order IMD at 2 x 49 dBm - dBc		< -150	

Note: All VSWR data referenced to 50 Ohms.
* VSWR 1.3:1 (869-960 MHZ)

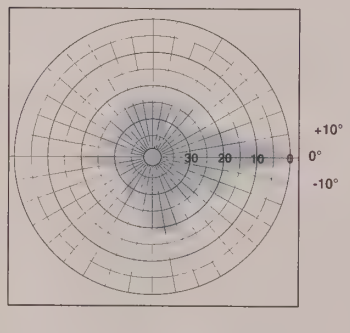
MECHANICAL SPECIFICATIONS	AP901008	AP901011	AP901013
Dimensions - WxDxH - in. mm.	10.4 x 5.1 x 24 265 x 130 x 600	10.4 x 5.1 x 39 265 x 130 x 987	10.4 x 5.1 x 78 265 x 130 x 1977
Weight - (excl. mtng. hdwre.) - lbs.(kg)	5.5(2.5)	10.8(4.9)	20.95(9.5)
Weight - Mounting Hardware - lbs. (kg)	.441(0.2) (APM4-1)	6.8(3.1) (APM2-1)	6.8(3.1) (APM2-1)
Radiating Element Material		Aluminum (AlMg3)	
Radome Material		UV-Resistant - ASA	
Wind Loading Area - ft.² (m²)	1.61(.150)	2.71(.252)	5.42(.504)
Rated Wind Velocity - mph (km/hr)	125(200)	125(200)	125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	92.2(41.8)	158.8(72.0)	345.4(156.7)
Mounting Hardware - Supplied		Hot Galvanized Steel	



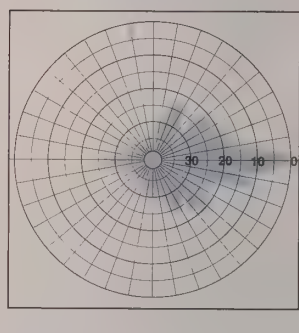
AP901008



AP901011



AP901013



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120° Microcell Sector Antennas

AP881205 (previously PD10216) 4.5 dBd Gain
AP881208 (previously PD10217) 7.5 dBd Gain

These 120 degree directional panel antennas have been specifically designed for low density three sector AMPS/TACS cell sites, where AMPS/TACS/GSM systems are combined in a single antenna. Their wide bandwidth allows for their use for transmit, receive and full duplex applications. Both feature a side-fed dipole design and low loss air dielectric strip-line feed.

Their high, front-to-back ratio effectively isolates interference from adjacent cells and makes them nearly impervious to tower changes. All components are aluminum alloy; stainless steel screws are double secured to eliminate non-linear joints. A high impact, low loss, UV stabilized weather resistant radome ensures the antenna's use in all climates and hostile environmental conditions.

- **Slim profile** — Aesthetically pleasing may be painted to blend with architecture.*
- **Weather resistant** — Protects radiating elements from hostile environment, minimizes pattern distortion due to ice build-up.
- **High front-to-back ratio** — Isolates from co-channel and adjacent sites.

*Contact Sales Engineering for painting instructions.

Ordering Information

Item Number	Frequency Range - MHz
AP881205	806-960
AP881208	806-960

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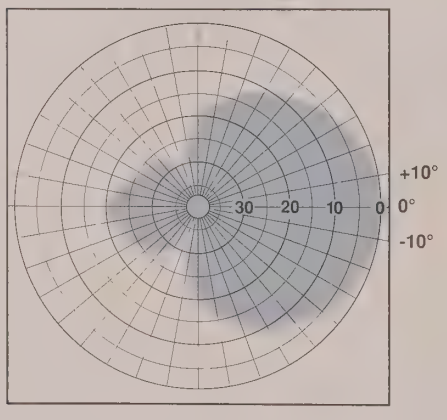
120° Microcell Sector Antennas

ELECTRICAL SPECIFICATIONS	AP881205	AP881208
Frequency Range - MHz	806-960	806-960
Gain - dBd	4.5	7.5
Bandwidth-MHz for 1.5:1 VSWR	154	154
Horizontal Beamwidth 1/2 Power Points	120°	120°
Vertical Beamwidth 1/2 Power Points	62°	31°
Maximum Power Input - Watts	500	500
Front-to-Back Ratio - dBd	24	24
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct, Supplied	N-female	N-female

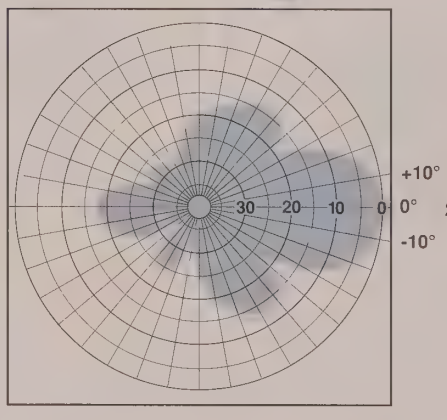
Note: All VSWR referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	AP881205	AP881208
Width - in. (mm)	7.625 (193.7)	7.625 (193.7)
Height - in. (mm)	12.25 (311.2)	25.25 (641.4)
Depth - in. (mm)	5.0 (127)	5.0 (127)
Weight - lbs. (kg)	4 (1.8)	6 (2.7)
Radiating Element Material	Aluminum Alloy	Aluminum Alloy
Radome Material	UV Stabilized High Impact ABS Plastic	UV Stabilized High Impact ABS Plastic
Reflector Material	5052-H32 Aluminum	5052-H32 Aluminum
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	0.43 (0.039)	0.89 (0.08)
Rated Wind Velocity - mph (km/hr)	100 (161)	100 (161)
Lateral Thrust @ 100 mph - lbs. (kg)	17.3 (7.79)	35.7 (16.07)
Torsional Moment @ 100 mph w/std. Mounting - ft. lbs. (mk/g)	5.2 (0.72)	10.7 (1.48)
Mounting Hardware	PD10238 Clamp Set	PD10238 Clamp Set
Shipping Mode	UPS	UPS

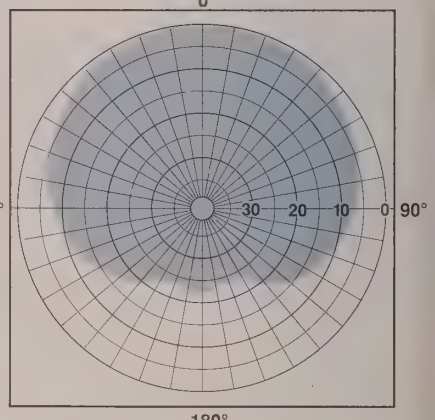
VERTICAL PATTERN ☐ AP881205



VERTICAL PATTERN ☐ AP881208



HORIZONTAL PATTERN ☐ AP881205 AP881208



CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

CELlite® 120° Directional Panel Antennas

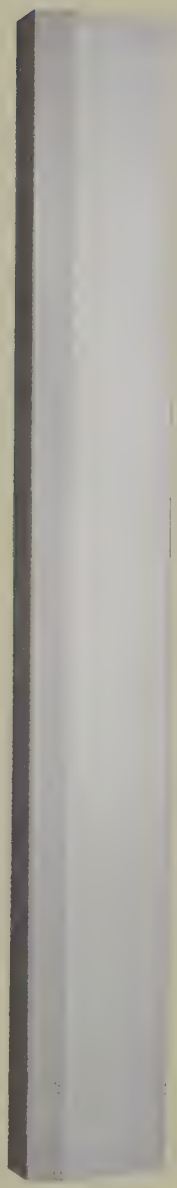
AP901208 **7.5 dBd Gain**
AP901210 **10 dBd Gain**
AP901213 **12.5 dBd Gain**

These CELlite antennas are designed for applications in the AMPS, NAMPS, TACS, ETACS, NMT, GSM and EGSM cellular radio systems in the 824 to 960 MHz frequency band. The antennas are manufactured with premium quality materials to ensure superior performance. The microstripline feed system consists of monolithic aluminum construction allowing for minimal welded joints to reduce the possibility of intermodulation problems. Each antenna features a lightweight, one piece, panel construction for ease of installation, reducing handling cost. All aluminum components are treated to minimize corrosion, assuring reliable operation in icing, salt air and rain conditions.

- **Broadband** — One antenna covers the entire band
- **Monolithic construction** — Reduced intermodulation
- **UV stabilized radome** — Protects radiating elements from hostile environments.
- **Surface treated components** — To prevent galvanic corrosions
- **High front-to-back ratio** — Ensures effective isolation from adjacent systems

Ordering Information

Item Number	Mounting Hardware Included	Mounting Pipe Dia.
AP9012XX-1	Downtilt APM1-1	2-3.5"
AP9012XX-2	Downtilt APM2-1	2-3.5"
AP9012XX-3	Fixed Mt. U-clamp Set APM3-1	2-3.5"
AP9012XX-4	Fixed Mt. Clamp Set APM4-1	1.5-7.87"



AP901208

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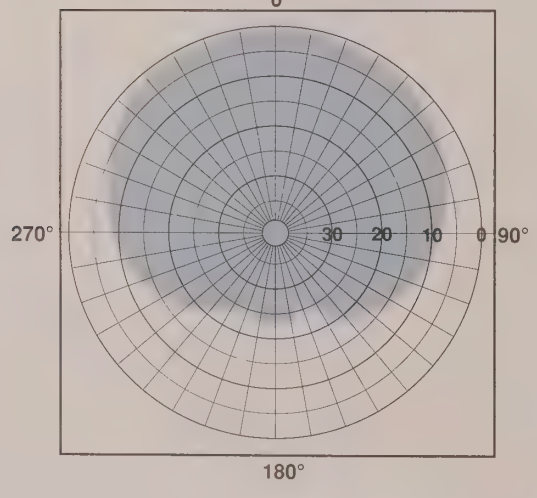
CELlite® 120° Directional Panel Antennas

ELECTRICAL SPECIFICATIONS	AP901208	AP901210	AP901213
Frequency Range - MHz	824-960	824-960	824-960
Gain min. - dBd/dBi	7.5/9.6	10/12.1	12.5/14.6
Bandwidth - MHz for 1.5:1 VSWR*	136	136	136
Horizontal Beamwidth - Degrees	120	120	120
Vertical Beamwidth - Degrees	35	17.5	8.5
Polarization		Vertical	
Power, Max.- Watts	1000	1000	1000
Front-to-Back Ratio - dB	>21	>21	>21
Lightning Protection		Direct Ground	
Connector Type - Standard Option		7/16 DIN Female Type - N	
3rd Order IMD at 2 x 49 dBm - dBc		< -150	

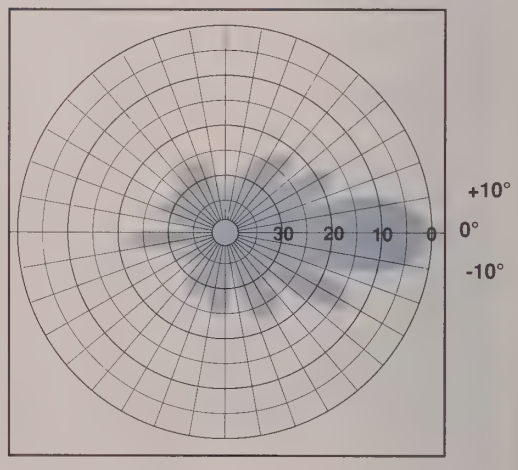
Note: All VSWR data referenced to 50 Ohms.
* VSWR 1.3:1 (869-960 MHZ)

MECHANICAL SPECIFICATIONS	AP901208	AP901210	AP901213
Dimensions - WxDxH - in. mm.	10.4 x 5.1 x 24 265 x 130 x 600	10.4 x 5.1 x 39 265 x 130 x 987	10.4 x 5.1 x 78 265 x 130 x 1977
Weight - (excl. mtng. hdwre.) - lbs.(kg)	5.5(2.5)	10.8(4.9)	20.9(9.5)
Weight - Mounting Hardware - lbs. (kg)	.441(0.2) (APM4-1)	6.8(3.1) (APM2-1)	6.8(3.1) (APM2-1)
Radiating Element Material		Aluminum (AlMg3)	
Radome Material		UV-Resistant	
Wind Loading Area - ft.² (m²)	1.61(.150)	2.71(.252)	5.42(.504)
Rated Wind Velocity - mph (km/hr)	125(200)	125(200)	125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	92.2(41.8)	158.8(72.0)	345.4(156.7)
Mounting Hardware - Supplied		Hot Galvanized Steel	

TYPICAL
HORIZONTAL PATTERN 120 ° COVERAGE



AP901210
VERTICAL PATTERN 17.5° BEAMWIDTH



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Variable H Sector Panel Antennas

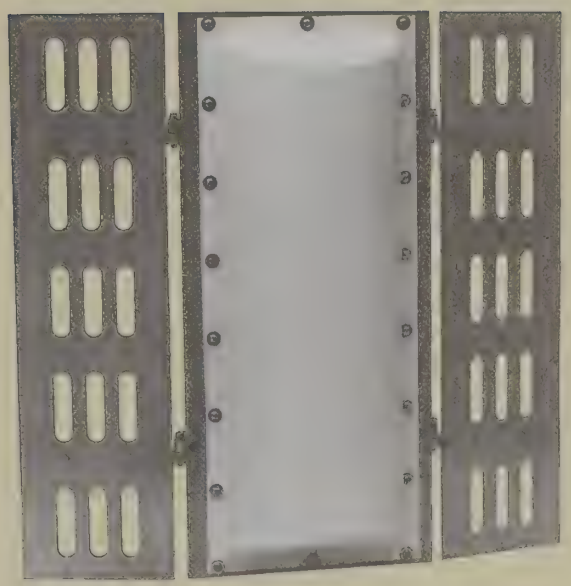
APV864612 **8.2 - 11.6 dBd Gain**
APV864615 **11.2 - 14.6 dBd Gain**
(previously PD10222)

The APV Series antennas are field adjustable variable sector panel antennas, designed to fill multiple horizontal pattern coverage requirements of the cellular user. This flexibility allows custom tailoring of cell coverage and avoids antenna replacement as sectors change. Their wide bandwidth permits use for transmit, receive and full duplex operations in the 824-894 MHz range, for both wireline and non wireline applications. The reflector can be easily adjusted and provides coverage in 6 different settings; 46°, 60°, 78°, 90°, 105°, and 110° horizontal beamwidth. The vertical pattern and the input VSWR remains constant at all H-plane settings. This antenna is supplied with a PD10238 bracket and PD10228 scissor kit to provide mechanical downtilting.

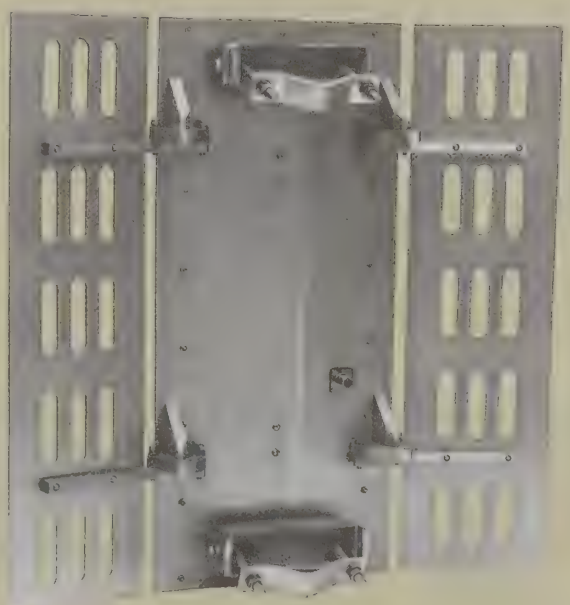
- **Flexibility** — Easily adapts to changing pattern needs without costly material and labor for antenna replacement.
- **Extends Asset Life** — Expensive antenna "swapouts" are eliminated.
- **Numbered Holes in Reflector** — Allows easy, precise field adjustments.
- **Superior Mechanical Design** — Provides excellent IM protection.
- **Front-to-Back Ratio** — The high 35 dBd front-to-back ratio is maintained at all H-plane settings.
- **Slotted Reflector** — Lightweight, easy to install, minimizes wind loading.

Ordering Information

Item Number	Frequency Range - MHz
APV864612	824-894
APV864615	824-894



APV864612 Front



APV864612 Back

U.S. PATENT PENDING

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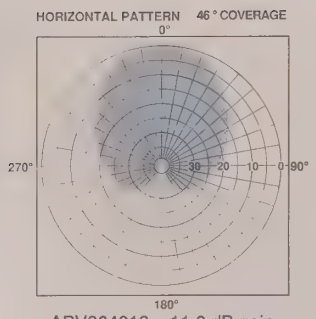
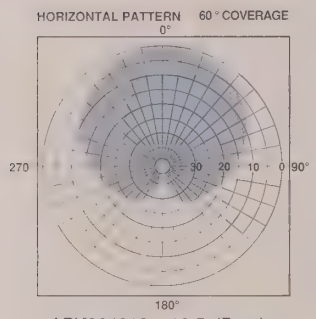
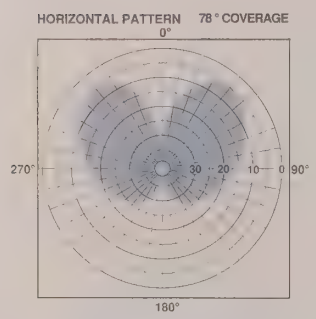
Variable H Sector Panel Antennas



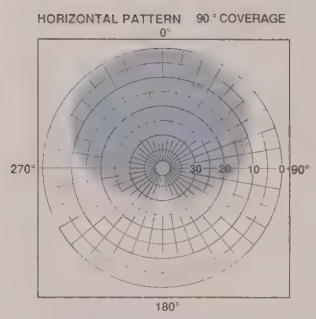
APV864612 11.6 dB gain
APV864615 14.6 dB gain



APV864612 10.5 dB gain
APV864615 13.5 dB gain



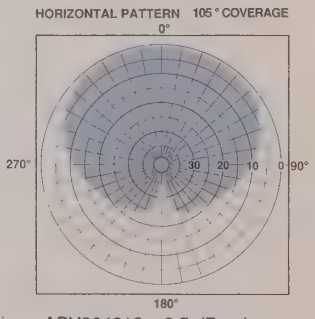
APV864612 9.7 dB gain
APV864615 12.7 dB gain



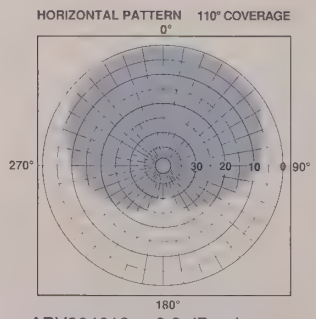
APV864612 9.0 dB gain
APV864615 12.0 dB gain

ELECTRICAL SPECIFICATIONS	APV864612		APV864615
Frequency Range - MHz		824-894	
Gain - dBd	8.2 -11.6		11.2 -14.6
Bandwidth - MHz		70	
Horizontal Beamwidth - Degrees		46 -110	
Vertical Beamwidth - Degrees	26		14
Maximum Power Input - Watts		500	
Front-to-Back Ratio - dBd		35 (TYP.)	
Lightning Protection		Direct Ground	
Termination - Direct Fixed		Type N-female	
Flexible Cable Extension		Optional	

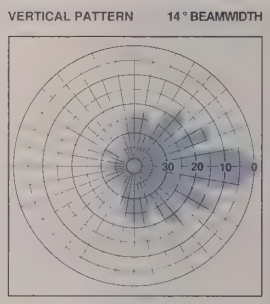
MECHANICAL SPECIFICATIONS	APV864612		APV864615
Height - in. (mm)	24.0 (610)		48.0 (1219.2)
Width - in. (mm)		25.0 (635)	
Depth - in. (mm)		4.5 (114.3)	
Weight- lbs. (kg)	12.0 (5.44)		24.0 (10.9)
Radiating Housing Material		5052-H32 Aluminum Alloy	
Radome Material		Weather Resistant Plastic	
Reflector Material		5032-H32 Aluminum Alloy	
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	4.17 (.388)		8.33 (.773)
Rated Wind Velocity - mph (km/hr)		100 (161)	
Lateral Thrust @ 100 mph Winds - lbs. (kg)	166.67 (75.6)		333.33 (151)
Torsional Moment @ 100 mph with Standard Mounting - ft. Lbs. (mk/g)	14.3(1.98)		28.6 (42.5)
Mounting Hardware - Supplied	PD10238-2		PD10238-2
Downtilt Kit	PD10228-5		PD10228-2
Shipping Weight - lbs. (kg)	25 (11.3)		37 (16.8)
Shipping Volume - ft.^{3} (m^3)		6.9 (2.0)	
Shipping Mode		UPS	



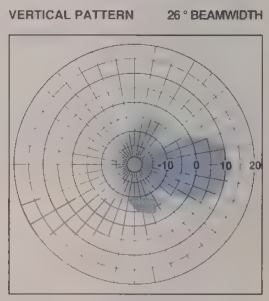
APV864612 8.5 dB gain
APV864615 11.5 dB gain



APV864612 8.2 dB gain
APV864615 11.2 dB gain



APV864615



APV864612

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2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

Low Gain Yagi Antenna

PD10212 **5.5 dBd Gain**

The PD10212 Yagi is a 5.5 dBd gain broadband antenna that covers the entire 806-960 MHz range in two bands. This low gain yagi is specifically designed for control station operations. It is ruggedly constructed of 6061-T6 aluminum material consisting of 5/16" diameter rods and 3/4" diameter tubing. The director and reflector elements are precision welded to the main boom, effectively eliminating misalignment problems during shipping, installation or service. The feed point radiator is enclosed in a molded ABS radome designed to protect against severe environmental conditions and minimize pattern distortion due to ice build-up.

The mounting hardware supplied facilitates mounting on either vertical or horizontal members. The small surface area on the PD10212 Yagi minimizes wind resistance and conserves tower loading capacity.

- **Aluminum Elements** — Welded solid rod for high strength, low weight and corrosion resistance.
- **Broadband** — Duplex operation for cellular and trunking applications.
- **ABS radome** — Protects the radiating elements against severe weather conditions.
- **Small Surface Area** — Minimizes wind resistance and conserves tower loading capacity.

PD10212

Ordering Information

Item Number	Frequency Range - MHz
PD10212-1	806-896
PD10212-2	900-960

WHEN ORDERING:
Provide frequency or frequency band.
Check catalog to comply with bandwidth constraints.

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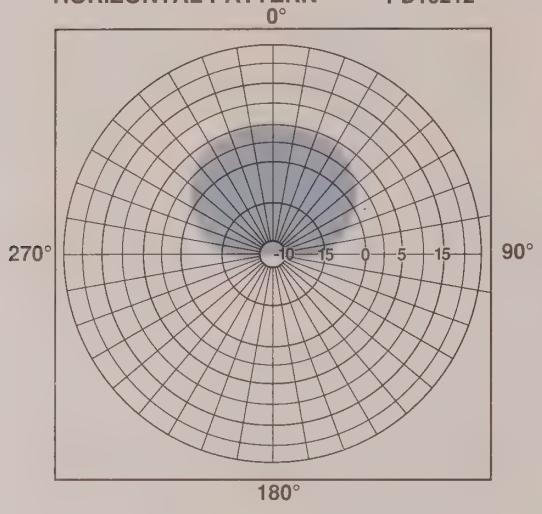
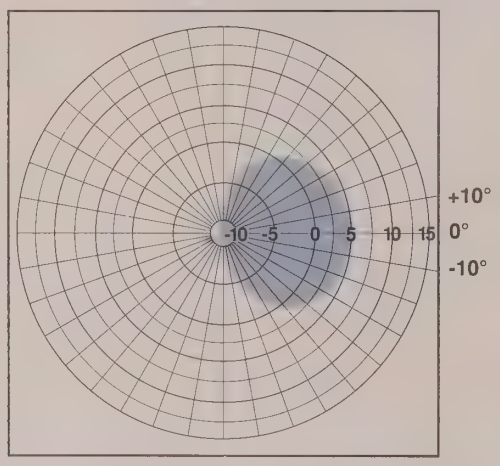
Low Gain Yagi Antenna

HORIZONTAL PATTERN PD10212



VERTICAL PATTERN PD10212



ELECTRICAL SPECIFICATIONS	PD10212
Frequency Range - MHz	806-960
Gain - dBd	5.5
Bandwidth - MHz	60+
Horizontal Beamwidth - Degrees	105
Vertical Beamwidth - Degrees	66
Maximum Power Input - Watts	150
Front-to-Back Ratio - dBd	20
Lightning Protection	Direct Ground
Termination - Direct Fixed	Type N-female
Flexible Cable Extension	Option

Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS	PD10212
Overall Length - in. (mm)	13.5 (343)
Support Pipe Diameter - in. (mm)	3/4" (19.1) 6061-T6 Aluminum
Element Length - in. (mm)	7.5 (190.5)
Element Material	5/16" 6061-T6 Aluminum
Antenna Weight- lbs. (kg)	3 (1.36)
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)	.18 (.017)
Rated Wind Velocity - mph (km/hr)	150 (242)
Lateral Thrust @ 100 mph - lbs. (kg)	7.2 (3.26)
Torsional Moment @ 100 mph with Standard Mounting - ft./lbs. (m/kg)	6.6 (.912)
Mounting Hardware - Supplied	Either integral plate with U-bolts or PD237 Clamp Set
Shipping Weight - lbs. (kg) with plate	3 (1.36)
with PD237 clamp	6 (2.72)
Shipping Volume - ft.^{3} (m^3)	.74 (.021)
Shipping Mode	UPS

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Yagi Antennas

PD10108 — 9 Element 10 dBd Yagi
PD10108D — Dual Yagi 13 dBd

The PD10108 Broadband yagi is specifically designed for control station operation. This antenna is ruggedly constructed of 6061-T6 aluminum rod and pipe. Director and reflector elements are precision welded to their main boom, effectively eliminating misalignment problems during shipping, installation or service. Radiating elements are enclosed in a molded ABS radome to protect against severe environmental conditions and minimize pattern distortion due to ice buildup. The mounting hardware supplied facilitates mounting on either vertical of horizontal members. The small surface area of the PD10108 antenna minimizes wind resistance and conserves tower loading capacity.

The PD10108D consists of two PD10108 antennas stacked and fed in-phase through a matching transformer. Normal polarization is vertical, however, antennas may be horizontally polarized provided the connectors are in the same orientation.

- **6061-T6 Aluminum elements** — Welded solid rod for high strength, low weight and corrosion resistance.
- **Broadband** — Duplex operation for cellular and trunking applications.
- **Weatherproof radome** — Protects elements against severe weather conditions.

Ordering Information

Item Number		Frequency
Single	Dual	Range - MHz
PD10108-1	PD10108D-1	806-896
PD10108-2	PD10108D-2	880-960

PD10108*

*Normal polarization (of driven element) is vertical.

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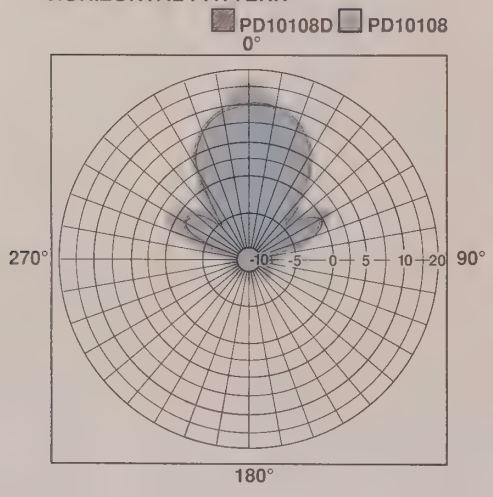
Yagi Antennas

ELECTRICAL SPECIFICATIONS	PD10108	PD10108D
Frequency Range - MHz	806-960	806-960
Gain - dBd	10	13
Bandwidth - MHz for 1.5:1 VSWR	80+	80+
Horizontal Beamwidth 1/2 Power Points	50°	22°
Vertical Beamwidth 1/2 Power Points	42°	42°
Maximum Power Input - Watts	150	150
Front-to-Back Ratio - dBd	20	20
Lightning Protection	Direct Ground	Direct Ground
Termination - Direct	N-female (Flexible Cable Option)	N-female (Flexible Cable Option)

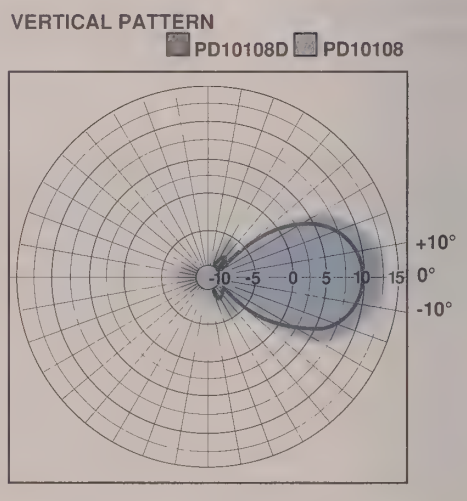
Note: All VSWR data referenced to 50 Ohms.

MECHANICAL SPECIFICATIONS		PD10108	PD10108D
Element Length @ 850 MHz - in. (mm)		7 (178)	7 (178)
Element Support Length @ 850 MHz - in. (mm)		31 (787)	31 (787)
Antenna Separation -		N/A	1-1/4λ
Weight - lbs. (kg)	with Plate(s) with PD237 Clamp	5 (2.27) 8 (3.63)	13 (5.91) 19 (8.64)
Element Material		6061-T6 Aluminum	6061-T6 Aluminum
Element Support Material in. (mm)		3/4 in. (19.1) diameter 6061-T6 Aluminum Tube	3/4 in. (19.1) diameter 6061-T6 Aluminum Tube
Wind Loading Area Flat Plate Equivalent - ft.^{2} (m^2)		.18 (.017)	.38 (.035)
Rated Wind Velocity - mph (km/hr)		150 (242)	150 (242)
Lateral Thrust @ 100 mph - lbs. (kg)		7.2 (3.3)	15.2 (6.9)
Torsional Moment @ 100 mph with Standard Mounting - ft./lbs. (m/kg)		9.3 (1.3)	N/A
Mounting Hardware - Supplied		Integral plate with U-bolts	Integral plate with U-bolts
Shipping Weight - lbs. (kg)	with Plate(s) with PD237 Clamp	7.3 (3.32) 10.3 (4.68)	15.3 (6.95) 21.3 (9.68)
Shipping Volume - ft.^{3} (m^3)		2.0 (.06)	4.0 (.12)
Shipping Mode		UPS	UPS

HORIZONTAL PATTERN



VERTICAL PATTERN



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Omnidirectional Antennas

AO1803 **3 dBd Gain**
AO1903 **3 dBd Gain**

These antennas are designed for applications in the DCS 1800 band and in both the DECT and PCS 1900 MHz frequency bands. It is a simplified suppressor type design that allows for the wide bandwidth and excellent reliability. The fiberglass radome protects the copper radiating elements from hostile environments.

- **Copper radiating elements** — Minimizes possibility of intermod generation.
- **Small diameter construction** — Reduced windloading.
- **Broadband design** — One antenna covers the entire band.

Ordering Information

Item Number	Frequency Range - MHz	Mounting Hardware
AO1803-1	1710-1880 MHz	N275F Mast Mount
AO1803-2	1710-1880 MHz	E179F & N240F-Flange
AO1903-1	1850-1990 MHz	N275F Mast Mount
AO1903-2	1850-1990 MHz	E179F & N240F-Flange

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

AO1803

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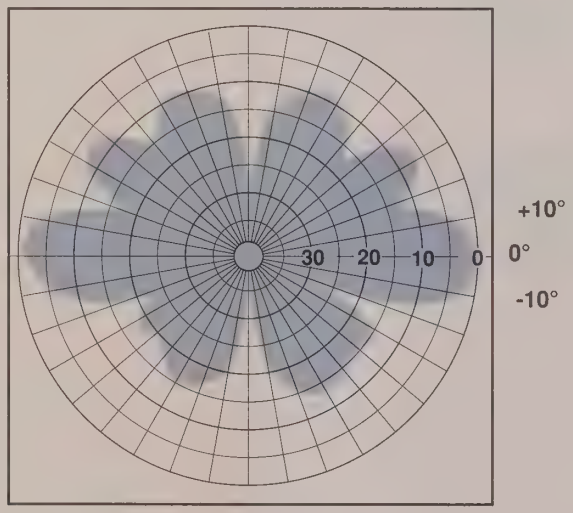
Omnidirectional Antennas

ELECTRICAL SPECIFICATIONS	AO1803		AO1903
Frequency Range - MHz	1710 -1880		1850 -1990
Gain min. - dBd/dBi	3/5.1		3/5.1
Bandwidth - MHz for 1.5:1 VSWR*	170		140
Vertical Beamwidth - Degrees	18		18
Horizontal Beamwidth - Degrees	OMNI		OMNI
Polarization		Vertical	
Power, Max.- Watts	150		150
Lightning Protection		Direct Ground	
Connector Type - Standard		N-Female	

Note: All VSWR data referenced to 50 OHMS.

MECHANICAL SPECIFICATIONS	AO1803		AO1903
Dimensions - ft.(m.)	1.96(0.6)		1.96(0.6)
Weight - (excl. mtng. hdwre.) - lbs.(kg)	.882(.4)		.882(.4)
Radiating Element Material		Copper	
Radome Material		Fiberglass	
Wind Loading Area - ft.^{2} (m^2)	1.076(0.01)		1.076(0.01)
Rated Wind Velocity - mph (km/hr)	125(200)		125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	5.3(2.4)		5.3(2.4)
Mounting Hardware - Supplied		See Ordering Information	

VERTICAL PATTERN **18° BEAMWIDTH**



CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

Omnidirectional Antennas

AO1809 **9 dBd Gain**
AO1909 **9 dBd Gain**

These center-fed design antennas ensure consistent gain and impedence over the entire frequency band of 1710 -1880 MHz and 1850-1990 MHz. The radiating elements are made of copper and enclosed in a weatherproof, low-loss, fiberglass housing. The base of the antenna is a die-cast aluminum support. The antenna base permits the antenna to be top-mounted with the cable inside the support pipe. Alternately, the antenna can be side mounted with the cable running along the outside of the support pipe. Each antenna can also be mounted inverted using the supplied hardware screws (read instructions before mounting.)

- **Heavy-duty lightning protection and DC ground** — Protects against damage from lightning.
- **Center-fed design** — Eliminates beamswing across the band.
- **Small diameter construction** — Reduced wind loading
- **Broadband design** — One antenna covers entire band.
- **Versatile base mount** — Permits various mounting capabilities.

Ordering Information

Item Number	Frequency Range - MHz
AO1809	1710-1880 MHz
AO1909	1850-1990 MHz

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

AO1809

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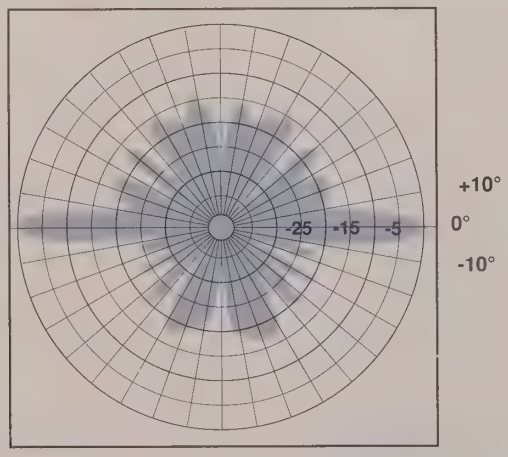
Omnidirectional Antennas

ELECTRICAL SPECIFICATIONS	AO1809	AO1909
Frequency Range - MHz	1710-1880	1850-1990
Gain min. - dBd/dBi	9/11	9/11
Bandwidth - MHz for 1.5:1 VSWR*	170	140
Vertical Beamwidth - Degrees	6.5	6.5
Polarization	Vertical	
Power, Max.- Watts	500	500
Lightning Protection	Direct Ground	
Connector Type - Fixed	7/16 DIN Female	
Electrical Downtilt - Degrees	Contact Celwave Sales Engineering	
3rd Order IMD at 2 x 38 dBm	< -160	

Note: All VSWR data referenced to 50 OHMS.

MECHANICAL SPECIFICATIONS	AO1809	AO1909
Dimensions - ft.(m.)	5.6(1.7)	5.3(1.6)
Diameter - in.(mm)	1.97(50)	1.97(50)
Weight - Incl. Mounting Hardware - lbs. (kg)	8.8(4)	8.8(4)
Radiating Element Material	Copper	
Radome Material	UV-Resistant Fiberglass, Light Grey	
Wind Loading Area - ft.^{2} (m^2)	.914(.085)	.914(.085)
Rated Wind Velocity - mph (km/hr)	125(200)	125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	35.7(16.2)	35.7(16.2)
Mounting Hardware - Supplied	(2) U-bolts	

VERTICAL PATTERN 6.5° BEAMWIDTH



CELWAVE®
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2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

CELlite® 33° Directional Panel Antennas

AP183312 **12 dBd Gain**
AP183315 **15 dBd Gain**
AP183317 **17 dBd Gain**

These CELlite antennas are designed for applications in the DCS 1800 and PCS cellular radio systems in the 1710 to 1990 MHz band. The antennas are manufactured with premium quality materials to ensure superior performance. The microstripline feed system consists of monolithic aluminum construction allowing for minimal welded joints to reduce the possibility of intermodulation problems. Each antenna features a lightweight, one piece, panel construction for ease of installation, reducing handling cost. All aluminum components are treated to minimize corrosion, assuring reliable operation in icing, salt air and rain conditions.

- **Very broadband** — One antenna covers the entire band.
- **Monolithic construction** — Reduces IM.
- **UV stabilized fiberglass radome** — Protects radiating elements from hostile environments.
- **High front-to-back ratio** — Ensures effective isolation from adjacent systems.

AP183312

Ordering Information

Item Number	Mounting Hardware	Electrical Tilt
AP183312-4TO	Fixed Mount (hose clamp) - APM14-1	0
AP183315-2TO	Downtilt Bracket - APM13-1	0
AP183315-4TO	Fixed Mount (hose clamp) - APM14-1	0
AP183317-2T2	Downtilt Bracket - APM13-1	2
AP183317-4T2	Fixed Mount (hose clamp) - APM14-1	2

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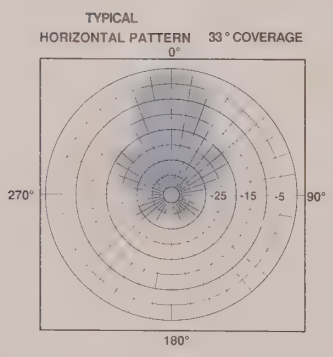
CELlite® 33° Directional Panel Antennas

ELECTRICAL SPECIFICATIONS	AP183312	AP183315	AP183317
Frequency Range - MHz	1710-1990	1710-1990	1710-1990
Gain min. - dBd/dBi	12/14	15/17	17/19
Bandwidth - MHz for 1.5:1 VSWR*	280	280	280
Horizontal Beamwidth - Degrees	33	33	33
Vertical Beamwidth - Degrees	15	9.5	7.0
Polarization		Vertical	
Power, Max.- Watts	500	500	500
Front-to-Back Ratio - dB	<25	<25	<25
Lightning Protection		Direct Ground	
Connector Type - Standard		7/16 DIN-Female	
Electrical Downtilt - Degrees	0	0	2
Null Fill - dB	N/A	> -25	> -25
3rd Order IMD at 2 x 38 dBm - dBc		< -160	

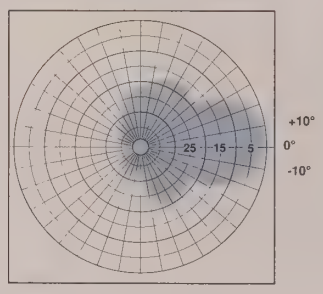
Note: All VSWR data referenced to 50 Ohms.
* VSWR 1.3:1 (1710-1880 MHZ)

MECHANICAL SPECIFICATIONS	AP183312	AP183315	AP183317
Dimensions - WxDxH - in. mm.	11.8 x 11.8 x 2.0 300 x 300 x 50	11.8 x 27.5 x 2.0 300 x 700 x 50	11.8 x 39.4 x 2.0 300 x 1000 x 50
Weight - (excl. mtng. hdwre.) - lbs.(kg)	4.2(1.9)	8.2(3.7)	11.0(5)
Weight - Mounting Hardware* - lbs. (kg)	1.1(.5)	1.1(.5)	1.1(.5)
Radiating Element Material		Aluminum	
Radome Material		UV-Stabilized ASA	
Wind Loading Area - ft.² (m²)	.269(0.09)	.764(0.21)	2.02(0.3)
Rated Wind Velocity - mph (km/hr)	125(200)	125(200)	125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	54.9(24.9)	135.7(61.5)	198.5(90.0)
Mounting Hardware - Supplied		Aluminum and Hot Galvanized Steel	

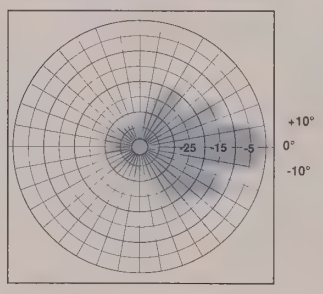
*Includes APM-14



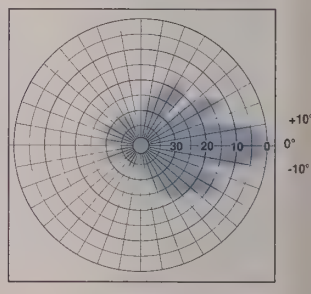
AP183312



AP183315



AP183317



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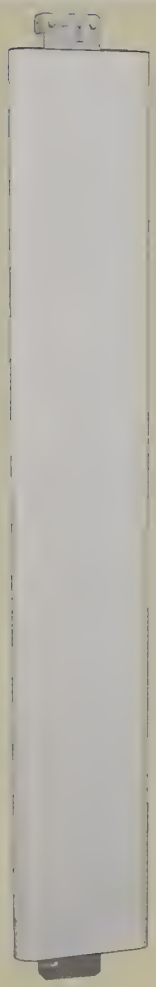
CELlite® 65° Directional Panel Antennas

AP186508	**8 dBd Gain**
AP186512	**12 dBd Gain**
AP186515	**15 dBd Gain**
AP186516	**16 dBd Gain**

These CELlite antennas are designed for applications in the DCS 1800 and PCS cellular radio systems in the 1710 to 1990 MHz band. The antennas are manufactured with premium quality materials to ensure superior performance. The microstripline feed system consists of monolithic aluminum construction allowing for minimal welded joints to reduce the possibility of intermodulation problems. Each antenna features a lightweight, one piece, panel construction for ease of installation, reducing handling cost. All aluminum components are treated to minimize corrosion, assuring reliable operation in icing, salt air and rain conditions.

- **Very broadband** — One antenna covers the entire band.
- **Monolithic construction** — Reduces IM.
- **UV stabilized fiberglass radome** — Protects radiating elements from hostile environments.
- **Surface treated components** — Prevents galvanic corrosion.
- **High front-to-back ratio** — Ensures effective isolation from adjacent systems.

AP186508



AP186512

Ordering Information

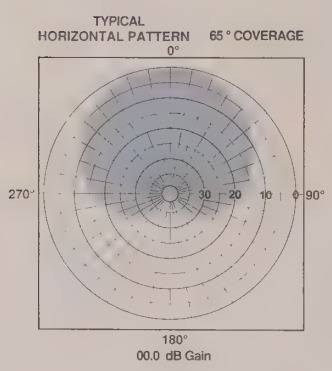
Item Number	Mounting Hardware	Electrical Tilt
AP186508-4T0	Fixed Mount (Hose Clamp), AMP14-1	0
AP186512-4T0	Fixed Mount (Hose Clamp), AMP14-1	0
AP186515-2T0	Down Tilt, APM13-1	0
AP186515-2T2	Down Tilt, APM13-1	-2
AP186515-2T6	Down Tilt, APM13-1	-6
AP186515-4T0	Fixed Mount (Hose Clamp), AMP14-1	0
AP186515-4T2	Fixed Mount (Hose Clamp), AMP14-1	-2
AP186515-4T6	Fixed Mount (Hose Clamp), AMP14-1	-6
AP186516-2T0	Down Tilt, APM13-1	0
AP186516-2T10	Down Tilt, APM13-1	-10
AP186516-2T2	Down Tilt, APM13-1	-2
AP186516-2T5	Down Tilt, APM13-1	-5
AP186506-4T0	Fixed Mount (Hose Clamp), AMP14-1	0
AP186516-4T10	Fixed Mount (Hose Clamp), AMP14-1	-10
AP186506-4T2	Fixed Mount (Hose Clamp), AMP14-1	-2
AP186516-4T5	Fixed Mount (Hose Clamp), AMP14-1	-5

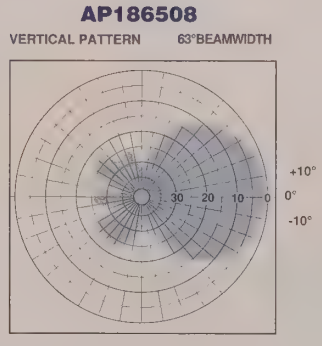
CELlite® 65° Directional Panel Antennas

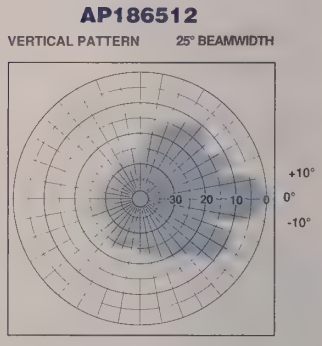
ELECTRICAL SPECIFICATIONS	AP186508	AP186512	AP186515	AP186516
Frequency Range - MHz	1710-1990	1710-1990	1710-1990	1710-1990
Gain min. - dBd/dBi	8/10	12/14	15/17	16/18
Bandwidth - MHz for 1.3:1 VSWR*	280	280	280	280
Horizontal Beamwidth - Degrees	65	65	65	65
Vertical Beamwidth - Degrees	63	25	12	10
Polarization	Vertical			
Power, Max.- Watts	500	500	500	500
Front-to-Back Ratio - dB	>25	>25	>25	>25
Lightning Protection	Direct Ground			
Connector Type - Standard	7/16 DIN Female			
Electrical Downtilt - Degrees	0	0	0, 2, 6	0, 2, 5, 10
Null Fill - dB	N/A	N/A	> -25	> -25
3rd Order IMD at 2 x 38 dBm - dBc	< -160			

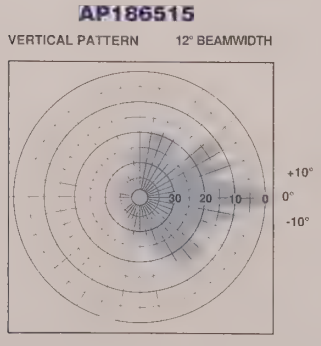
Note: All VSWR data referenced to 50 Ohms.

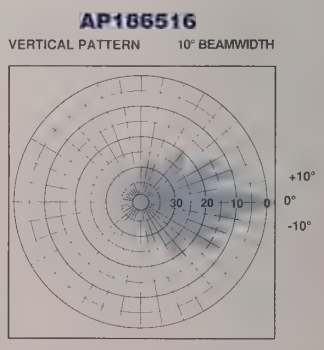
MECHANICAL SPECIFICATIONS	AP186508	AP186512	AP186515	AP186516
Dimensions - WxDxH - in. mm.	7.8 x 2.0 x 11.8 198 x 50 x 300	7.8 x 2.0 x 23.6 198 x 50 x 600	7.8 x 2.0 x 39.4 198 x 50 x 1000	7.8 x 2.0 x 51.2 198 x 50 x 1300
Weight - (excl. mtng. hdwre.) - lbs.(kg)	2.2(1.)	3.3(1.5)	8.6(3.9)	10.4(4.7)
Weight - Mounting Hardware (APM14-1) - lbs. (kg)	1.1(.5)	1.1(.5)	1.1(.5)	1.1(.5)
Radiating Element Material	Aluminum			
Radome Material	UV-Stabilized High Impact ABS Plastic			
Wind Loading Area - ft.² (m²)	.419(.039)	.817(.078)	1.39(.13)	1.81(.169)
Rated Wind Velocity - mph (km/hr)	125(200)	125(200)	125(200)	125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	24.3(11.0)	54.6(22.9)	90.4(41.0)	121.9(55.3)
Mounting Hardware - Supplied	Aluminum and Hot Dipped Galvanized Steel			











CELWAVE®
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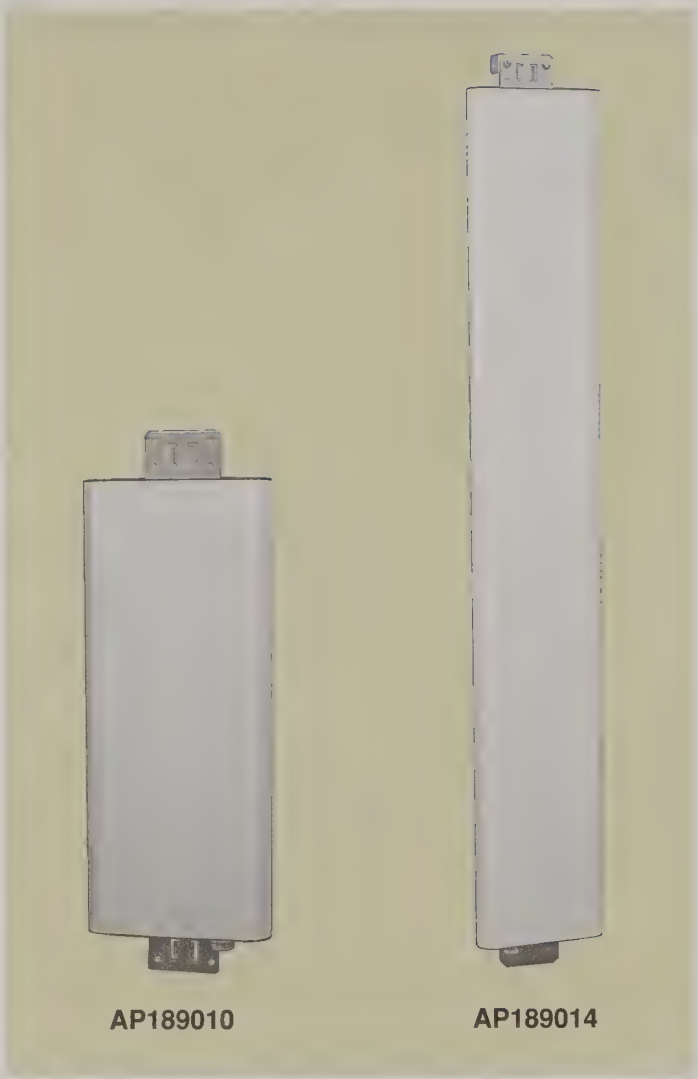
2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

CELlite® 90° Directional Panel Antennas

AP189006	**6 dBd Gain**
AP189010	**10 dBd Gain**
AP189014	**14 dBd Gain**
AP189015	**15.5 dBd Gain**

These CELlite antennas are designed for applications in the DCS 1800 and PCS cellular radio systems in the 1710 to 1990 MHz band. The antennas are manufactured with premium quality materials to ensure superior performance. The microstripline feed system consists of monolithic aluminum construction allowing for minimal welded joints to reduce the possibility of intermodulation problems. Each antenna features a lightweight, one piece, panel construction for ease of installation, reducing handling cost. All aluminum components are treated to minimize corrosion, assuring reliable operation in icing, salt air and rain conditions.

- **Very broadband** — One antenna covers the entire band.
- **Monolithic construction** — Reduces IM.
- **UV stabilized fiberglass radome** — Protects radiating elements from hostile environments.
- **Surface treated components** — To prevent galvanic corrosions.
- **High front-to-back ratio** — Ensures effective isolation from adjacent systems.



AP189010 AP189014

Ordering Information

Item Number	Mounting Hardware	Electrical Tilt
AP189006-4TO	Fixed Mount (Hose Clamp), AMP14-1	0
AP189010-4TO	Fixed Mount (Hose Clamp), AMP14-1	0
AP189014-2TO	Down Tilt, APM13-1	0
AP189014-4TO	Fixed Mount (Hose Clamp), AMP14-1	0
AP189014-2T2	Down Tilt, APM13-1	-2
AP189014-4T2	Fixed Mount (Hose Clamp), AMP14-1	-2
AP189015-2TO	Down Tilt, APM12-1	0
AP189015-2T2	Down Tilt, APM12-1	-2
AP189015-4TO	Fixed Mount (Hose Clamp), AMP14-1	0
AP189015-4T2	Fixed Mount (Hose Clamp), AMP14-1	-2

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CELlite® 90° Directional Panel Antennas

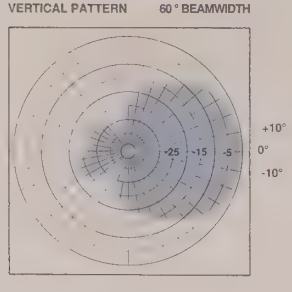
ELECTRICAL SPECIFICATIONS	AP189006	AP189010	AP189014	AP189015
Frequency Range - MHz	1710-1990	1710-1990	1710-1990	1710-1990
Gain min. - dBd/dBi	6/8	10/12	14/16	15.5/17.5
Bandwidth - MHz for 1.5:1 VSWR*	280	280	280	280
Horizontal Beamwidth - Degrees	90	90	90	90
Vertical Beamwidth - Degrees	60	18	8	5
Polarization	Vertical			
Power, Max.- Watts	500	500	500	500
Front-to-Back Ratio - dB	25	25	25	25
Lightning Protection	Direct Ground			
Connector Type - Standard	7/16 DIN Female			
Electrical Downtilt - Degrees	0	0	0, 2	0, 2
Null Fill - dB	N/A	N/A	> -25	> -25
3rd Order IMD at 2 x 38 dBm - dBc	< -160			

Note: All VSWR data referenced to 50 Ohms.
* VSWR 1.3:1 (1710-1880 MHZ)

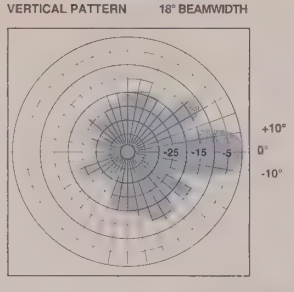
MECHANICAL SPECIFICATIONS	AP189006	AP189010	AP189014	AP189015
Dimensions - WxDxH - in. mm.	7.8 x 2.0 x 6.5 198 x 50 x 165	7.8 x 2.0 x 18.5 198 x 50 x 470	7.8 x 2.0 x 49.2 198 x 50 x 1250	7.8 x 2.0 x 72.8 198 x 50 x 1850
Weight - (excl. mtng. hdwre.) - lbs.(kg)	1.7(.80)	2.9(1.3)	6.6(3)	14.1(6.4)
Weight - Mounting Hardware* - lbs. (kg)	1.1(.5)	1.1(.5)	1.1(.5)	1.1(.5)
Radiating Element Material	Aluminum			
Radome Material	UV-Stabilized Polyester Fiberglass			
Wind Loading Area - ft.² (m²)	.269(.025)	.764(.071)	2.02(.188)	3.01(.278)
Rated Wind Velocity - mph (km/hr)	125(200)	125(200)	125(200)	125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	14.8(6.7)	45.0(20.4)	128.0(58.06)	208.3(94.5)
Mounting Hardware - Supplied	Aluminum and Hot Dipped Galvanized Steel			

*Includes APM14-1

AP189006



AP189010



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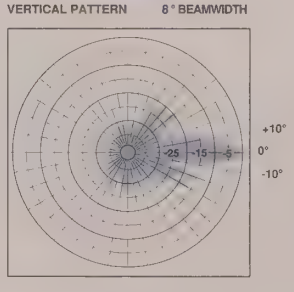
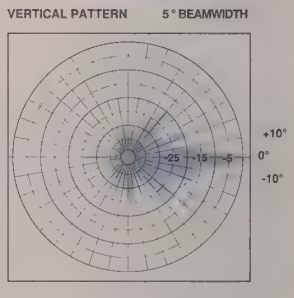
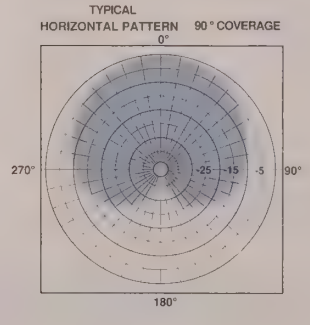


AP189015





CELlite® 120° Directional Panel Antenna

AP181213 **13 dBd Gain**

This CELlite antenna is designed for applications in the DCS 1800 and PCS 1900 cellular radio systems in the 1710 to 1990 MHz band. The CELlite antennas are manufactured with premium quality materials to ensure superior performance. The microstripline feed system consists of monolithic aluminum construction allowing for minimal welded joints to reduce the possibility of intermodulation problems. Each antenna features a lightweight, one piece, panel construction for ease of installation, reducing handling cost. All aluminum components are treated to minimize corrosion, assuring reliable operation in icing, salt air and rain conditions.

- **Very broadband** — One antenna covers the entire band.
- **Monolithic construction** — Reduces IM.
- **UV stabilized fiberglass radome** — Protects radiating elements from hostile environments.
- **Surface treated components** — To prevent galvanic corrosions.
- **High front-to-back ratio** — Ensures effective isolation from adjacent systems.

AP181213

Ordering Information

Item Number	Mounting Hardware Included
AP181213-2T0	APM13-1 Mechanical downtilt wall/pipe
AP181213-4T0	APM14-1 Fixed pipe mt., hose clamp

Mounting Hardware Optional

APM15-1 Wall mount without tilt

WHEN ORDERING:
Provide frequency or frequency band
Check catalog to comply with bandwidth constraints.

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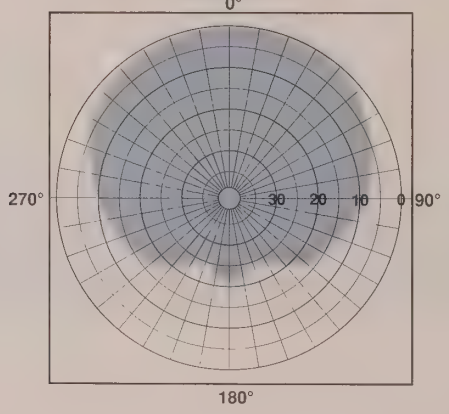
CELlite® 120° Directional Panel Antenna

ELECTRICAL SPECIFICATIONS	AP181213
Frequency Range - MHz	1710-1990
Gain min. - dBd/dBi	13/15
Bandwidth - MHz for 1.5:1 VSWR*	280
Horizontal Beamwidth - Degrees	120
Vertical Beamwidth - Degrees	8
Polarization	Vertical
Power, Max.- Watts	500
Front-to-Back Ratio - dB	> 20
Lightning Protection	Direct Ground
Connector Type - Standard	7/16 DIN Female
Electrical Downtilt - Degrees	-2

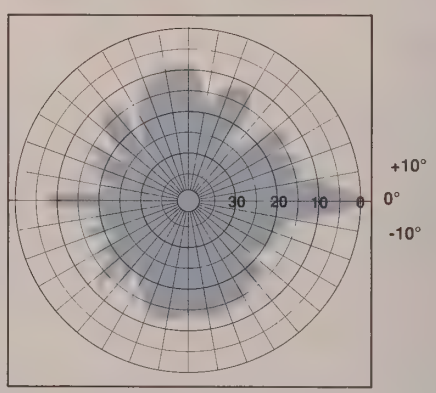
Note: All VSWR data referenced to 50 Ohms.
* VSWR 1.3:1 (1710-1880 MHZ)

MECHANICAL SPECIFICATIONS	AP181213
Dimensions - WxDxH - in. mm.	7.8 x 2.0 x 49.2 198 x 50 x 1250
Weight - (excl. mtng. hdwre.) - lbs.(kg)	6.6(3)
Weight - Mounting Hardware* - lbs. (kg)	1.1(.5)
Radiating Element Material	Aluminum(AlMg3)
Radome Material	UV-Resistant Polyester Fiberglass
Wind Loading Area - ft.² (m²)	2.02(0.188)
Rated Wind Velocity - mph (km/hr)	125(200)
Lateral Thrust @ Rated Winds - lbs.(kg)	128.0(58.06)
Mounting Hardware - Supplied	Aluminum Hot Dipped Galvanized Steel

HORIZONTAL PATTERN 120° COVERAGE



VERTICAL PATTERN 8° BEAMWIDTH



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Antenna Mounting Hardware

Clamps Sets, Crossover Plates, Wall Mounts, Pole Mounts

PD46 - Heavy Duty Universal Clamp Set. Mounts antennas equipped with 1 in. (25 mm) to 2-3/4 in. (70 mm) diameter support pipes on structures having 1 in. (25 mm) to 2-3/4 in. (70 mm) diameter support pipes and angle members 2 in. (51 mm) by 2 in. (51 mm). Net weight 9 lbs. (4.08 kg). Shipping volume 0.053 ft.^{3} (0.0015 m^3). UPS shippable.

PD346 - Heavy Duty Universal Clamp Set (large). Same as PD46 except mounts antennas equipped with 2-3/8 in. (60 mm) to 4 in. (102 mm) diameter support pipes on structures having 2-3/8 in. (60 mm) to 4 in. (201 mm) diameter support pipes and angle members 3 in. (76 mm) by 3 in. (76 mm). Net wt. 16 lbs. (7.26 kg). Shipping volume 0.22 ft.^{3} (0.006 m^3). UPS shippable.

PD46A - Clamp Set. Supplied with most side mounting hardware. Used to clamp antenna support pipe directly to each of two grounded lower support arms. Consists of two flat and two wrinkled plates, four hexbolts, eight nuts and lockwashers. Net wt. 5 lbs. (2.37 kg). Shipping volume .046 ft.^{3} (.0013 m^3). UPS shippable.

PD89 - Universal Clamp. One half of a PD46 Universal Clamp Set. Used as top support when side mounting a PD1132, PD1132-D or as replacement hardware for PD10022 antenna. Net wt.5 lbs. (2.27 kg). Shipping volume .053 ft.^{3} (.0015 m^3). UPS shippable.

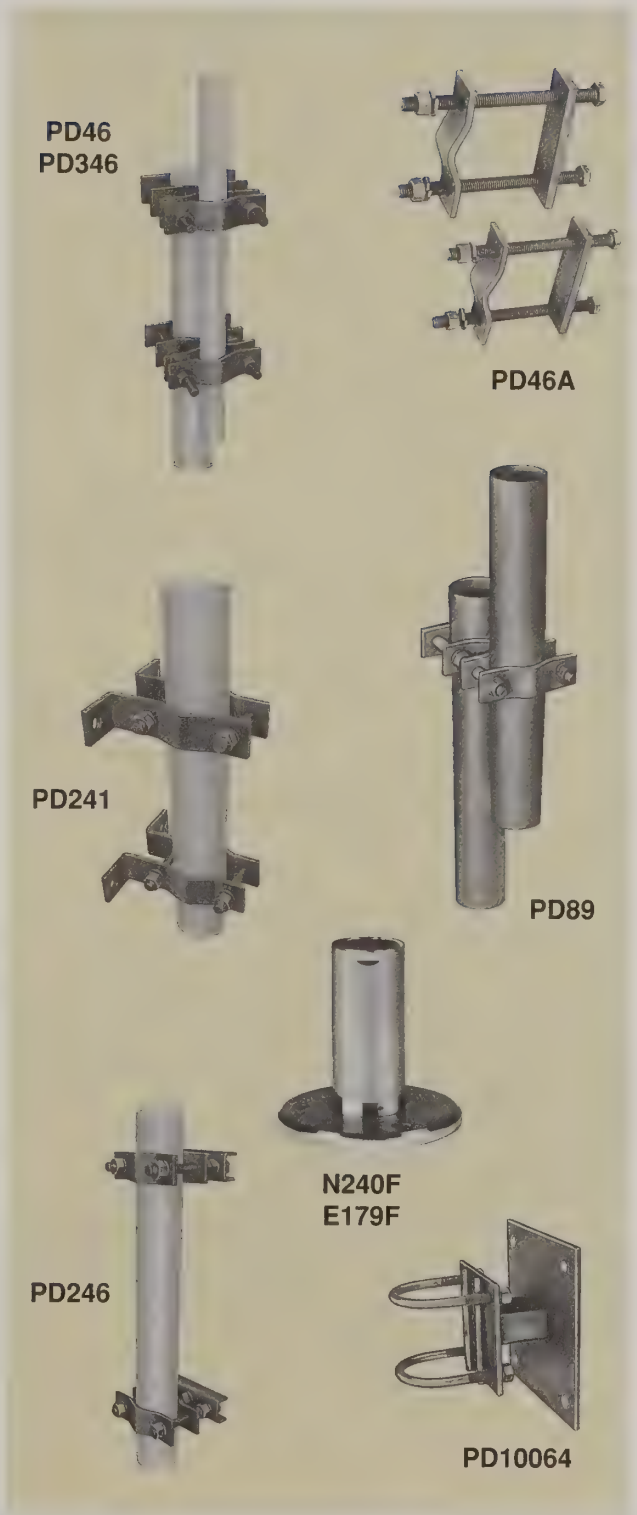
E179F - Univerasl Mount. Stand-off flange for mounting an antenna on a horizontal surface. Chrome plated brass. Must be ordered together E179F. Suitable for antennas: BA1012-10, BA6012-10, BA6312-10 and AO1803.

N240F - One inch Pipe Thread Mount for E179F. Chrome plated brass. Must be ordered together with E179F.

PD241 - Universal Clamp Set. Mounts antennas equipped with 1 in. (25 mm) to 2-3/4 in. (70 mm) diameter support pipes on flat vertical surfaces. Net wt. 6 lbs. (2.72 kg). Shipping volume 0.07 ft.^{3} (0.022 m^3). UPS shippable.

PD246 - Universal Clamp Set. Mounts antennas equipped with 1 in. (25 mm) to 2-3/4 in. (70 mm) diameter support pipes on wood utility poles. Adjusts for pole taper. Mounting holes are 15/16 in. (24 mm) diameter for 7/8 in. (22 mm) threaded crossarm rods. Bushings furnished reduced for 5/8 in. (16 mm) diameter lag screws. Crossarm rods or lag screws not furnished. Net wt. 6 lbs. (2.72 kg). Shipping volume 0.07 ft.^{3} (0.002 m^3). UPS shippable.

PD10064 - Wall Mounting Hardware for PD1132. An 8 in. (203 mm) square stainless steel plate provides four positions of wall attachment. Two galvanized U-bolts are provided to secure the antenna's support pipe. The PD10064 has 3-1/4 in. (82.5 mm) of standoff allowing the antenna to be directed/rotated 130 degrees. Three (3) PD10064 are suggested per antenna. Net wt. 8 lbs. (3.63 kg). Shipping volume .317 ft.^{3} (.0090 m^3). UPS shippable.



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Antenna Mounting Hardware

PD1253 - Mounting Hardware for mounting PD10054, PD10085L, PD10175, PD10177, PD10178, PD10188, PD10189, PD10197, PD10200, PD10186, PD10099, PD10055, PD10084, PD10085 and PD10176 antennas to support structures having diameters from 1-3/4 in. (44 mm) to 4 in. (102 mm). Net wt 2 lbs. (.91 kg). Shipping volume .20 ft.^{3} (0.006 m^3). UPS shippable.

PD1255 - Same as PD1253 except includes bracket for mounting PD10176 to non-AMP structures.

PD237 - Universal Crossover Clamp Assembly. This assembly is furnished with all required U-bolts for securing any combination of two intersecting pipes of the following sizes: 1-5/16 in. (49 mm) O.D., 1-15/16 in. (49 mm) and 2-3/8 in. (60 mm) O.D. Net wt. 6 lbs. (2.72 kg.). Shipping volume 0.06 ft.^{3} (0.002 m^3). UPS shippable.

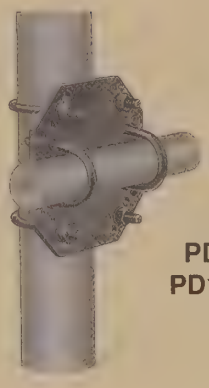
PD10087 - Large Universal Crossover Clamp Assembly. Similar to our PD237 except that it mounts a 2-3/8 inch (60 mm) diameter pipe to tower structures with 3 inch (76 mm), 4 inch (102 mm) or 5 inch (127 mm) diameters. This assembly is furnished with all required U-bolts. Net wt. 16 lbs. (7.26 kg). Shipping volume .20 ft.^{3} (.006 m^3). UPS shippable.

PD10238 - Mounting Bracket especially designed for panel antennas that will replace the earlier style brackets. This mounting bracket is installed at the time of antenna assembly and provides normal antenna mounting (0°) tilt. To acheive mechanical downtilt, the PD10228 scissor kit is used in conjunction with this bracket. Aluminum alloy with stainless steel hardware.

PD10228 - Scissor Kit. Used in conjunction with PD10238, this scissor kit is equipped with 2 adjustable arms which, when properly set, can acheive any angle from 0° to 15°, depending on the length of the panel antenna. The improved design allows for easy installation and accurate settings for downtilit measurement. The adjustable arm resembles a "half moon" design with bolt holes stamped with a number that corresponds to an angle from 0 to 15 degrees. This allows the installer the ease of setting the desired angle without taking measurements. Aluminum alloy with stainless steel hardware. Net wt. 2lbs. (.907 kg).

Note: The panel antennas previously fitted with the earlier style brackets will require a retrofit kit and an appropriate PD10228 scissor kit to provide for mechanical downtilt. To order, contact Celwave Sales Engineering. Instructions for installation are supplied with kit.

PD1253
PD1255



PD237
PD10087

PD10228

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Antenna Mounting Hardware

Side Mounting Assemblies

PD502 - Side Mounting Assembly. Mounts the PD83, PD114, PD128, PD152, PD207, PD340, PD345, PD440, PD453, PD206, PD1500 and PD1107 antennas on square or triangular towers having legs up to 2-3/8 in. (60 mm) in. diameter. Consists of a single grounded upper support and a single grounded lower support. These components are assembled using four (4) PD237 crossover plates and one (1) PD46A clamp set (supplied). The PD502 Side Mounting Kit mounts the antenna 6 in. (152 mm) to 3 ft. (0.91 m) away from a tower having face dimensions ranging between 1 ft. (0.3 m) and 2 ft. 0.6 m). Net wt. 32 lbs. (14.52 kg). Shipping volume 1.38 ft.^{3} (0.39 m^3). UPS shippable.

PD504 - Side Mounting Assembly. Same as PD502 except mounts antennas 6 in. (152 mm) to 7 ft. (2.1 m) away from a tower. Net wt. 32 lbs. (14.52 kg). Shipping volume 2.25 ft.^{3} (.064 m^3). Cannot be used with PD345.

PD10002 - Side Mounting Assembly. Consists of dual grounded support system. Mounts PD1610, and PD10022 antennas 6 in. (152 mm) to 3 ft. (0.91 m) away from a tower having round legs up to 2-3/8 in. (60 mm) diameter. Net wt. 32 lbs. (14.52 kg). Shipping volume 1.38 ft.^{3} (0.039 m^3). UPS shippable.

Note: Most antennas are supplied with mounting hardware. Should additional hardware be required, a selection may be made from the items shown above. All are UPS shippable.

PD402 - Side Mounting Assembly. Designed for mounting PD201 Stationmaster™ Antennas on square or triangular towers having round legs up to 2-3/8 in. 60 mm) in diameter. Consists of a single grounded lower support and an insulated upper support arm. These components are assembled using five (5) PD237 crossover plates (supplied). The assembly mounts antennas 6 in. (152 mm) to 3 ft. (0.91 m) away from a tower, having face dimensions ranging between 1 ft. (0.3 m) and 2 ft. (0.6 m). Net wt. 21 lbs. (9.53 kg). Shipping volume 1.38 ft.^{3} (0.39 m^3). UPS shippable. See Fig. 1.

PD403 - Side Mounting Assembly. Same as PD402 except mounts PD201 antenna, 6 in. (152 mm) to 7 ft. (2.1 m) away from a tower. Net wt. 40 lbs. (18.14 kg). Shipping volume 2.16 ft.^{3} (.061 m^3). See Fig. 1.

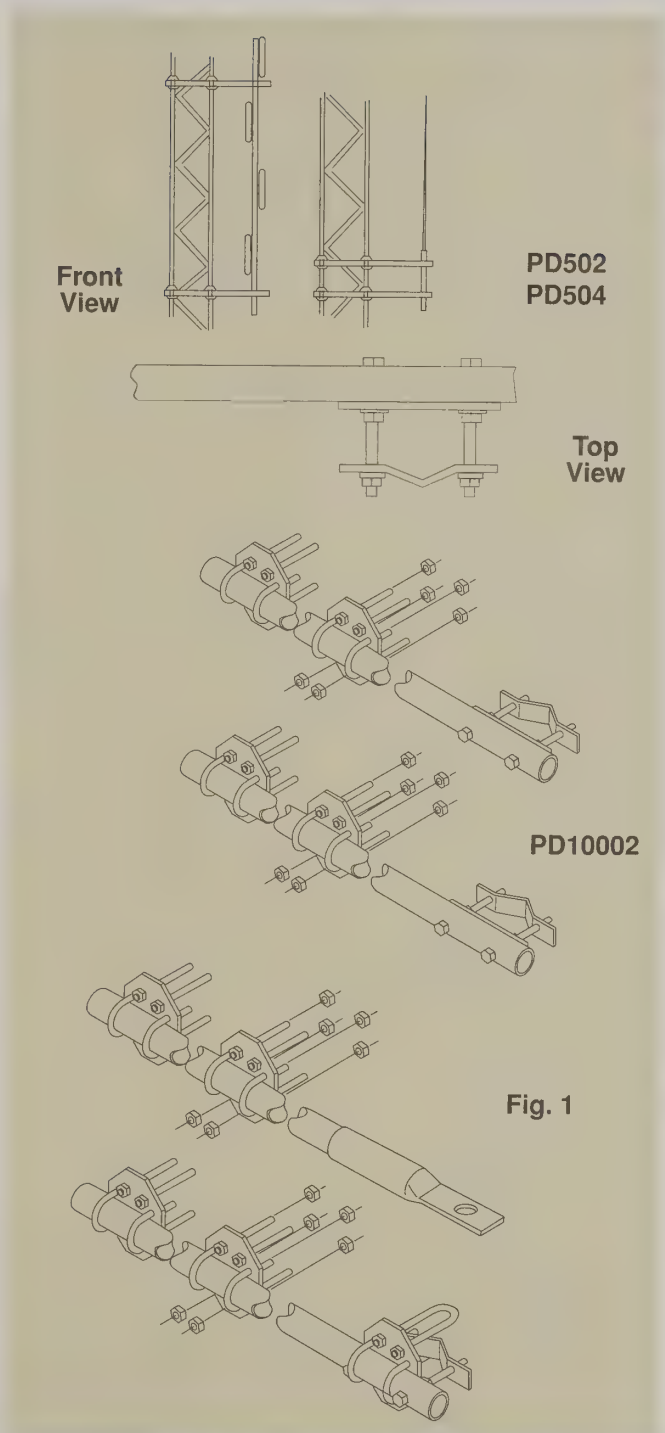

Fig. 1

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Antenna Mounting Hardware

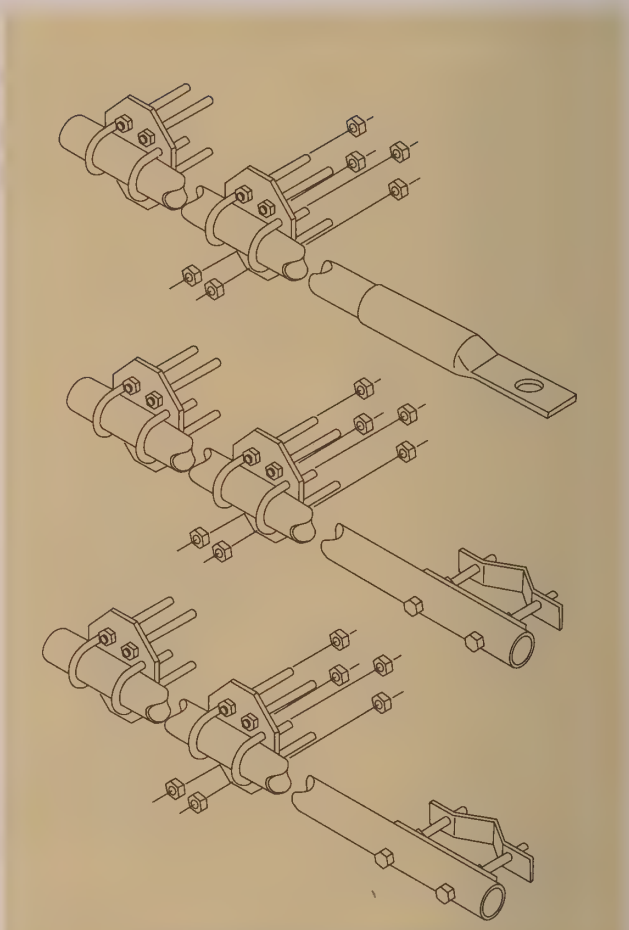
PD302 - Side Mounting Assembly. Designed for mounting the PD200, PD399, PD400 Stationmaster™ Antenna on square or triangular towers having round legs up to 2-3/8 in. (60 mm) in diameter. Consists of a dual grounded lower support system and an insulated upper support arm. These components are assembled using six (6) PD237 crossover plates andone (1) PD46A clamp set, (supplied). PD302 Side Mounting Assembly mounts antennas from 6 in. (152 mm) to 3 ft. (0.91 m) away from a tower having face dimensions ranging between 1 ft. (0.3 m) and 2 ft. (0.6 m). Net wt. 37 lbs. (16.78 kg) Shipping volume 1.38 ft.^{3} (0.39 m^3). UPS shippable.

PD303 - Side Mounting Assembly. Same as PD302 except mounts PD200 or PD399 antennas from 6 in. (152 mm) to 7 ft. (2.1 m) away from a tower. Net wt. 55 lbs. (24.95 kg). Shipping volume 2.16 ft.^{3} (.061 m^3).

PD503 - Side Mounting Assembly. Mounts PD220, PD455, PD1150, or PD1151* Super Stationmaster™ Antennas on square or triangular towers having round legs up to 2-3/8 in. (60 mm) in diameter. Consists of a dual grounded lower support system and an insulated upper support arm. These components are assembled using six (6) PD237 crossover plates and one (1) PD46A clamp set (supplied). PD503 Side Mounting Assembly mounts antennas 6 in. (152 mm) to 7 ft. (2.1 m) away from tower having face dimensions ranging between 1 ft. (0.3 m) and 2 ft. (0.6 m). Net wt. 49 lbs. (22.23 kg). Shipping volume 2.16 ft^3 (.061 m^3).

PD556 - Side Mounting Assembly. Same as PD503 except mounts PD220, PD455, PD1150 and PD1151 antennas 6 in. (152 mm) to 3ft. (0.91 m) away from tower. Net wt. 29 lbs. (13.15 kg). Shipping volume 1.38 ft.^{3} (0.39 m^3). UPS shippable.

*Consult Celwave Sales Engineering with specific mounting applications and/or questions.



Side Mounting Assembly

Antenna Mounting Hardware

Side Mounting Assemblies

PD561 - Side Mount Assembly. Mounts PD620 and PD755 Heavy Duty Super Stationmaster™ Antennas on square or triangular towers having round legs up to 2-3/8 in. (60 mm) in diameter. Consists of a dual grounded lower support system and an insulated upper support arm. These components are assembled using six (6) PD237 crossover plates and one (1) PD346A clamp set (supplied). PD561 Side Mounting Assembly mounts antennas 6 in. (152 mm) to 7 ft. (2.1 m) away from tower. Net wt. 50 lbs. (22.68 kg). Shipping volume 2.16 ft³. (.061 m³).

PD10024 - Side Mounting Assembly. Designed for mounting PD458, PD1108, PD1109, PD1110 and PD10017 antennas on square or triangular towers having round legs up to 2-3/8 in. (60 mm) in diameter. *High wind version antennas, contact Celwave Sales Engineering.* Consists of a dual grounded lower support system and an insulated adjustable upper support arm. These components are assembled using six (6) PD237 cross-over plates and one (1) PD46A clamp set (supplied). The PD10024 Assembly mounts antennas from 6 in. (152 mm) to 3 ft. (0.91 m) away from a tower having face dimensions ranging between 1 ft. (0.3 m) and 2 ft. (0.6 m). Net wt. 30 lbs. (13.6 kg). Shipping volume 1.38 ft.³ (.039 m³).

PD10028 - Side Mounting Assembly. Similar to PD10024 excepts mounts antennas from 6 in. (152 mm) to7 ft. (2.1 m) away from tower. Net wt. 55 lbs. (24.95 kg.) Shipping volume 2.16 ft.³ (0.061 m³).

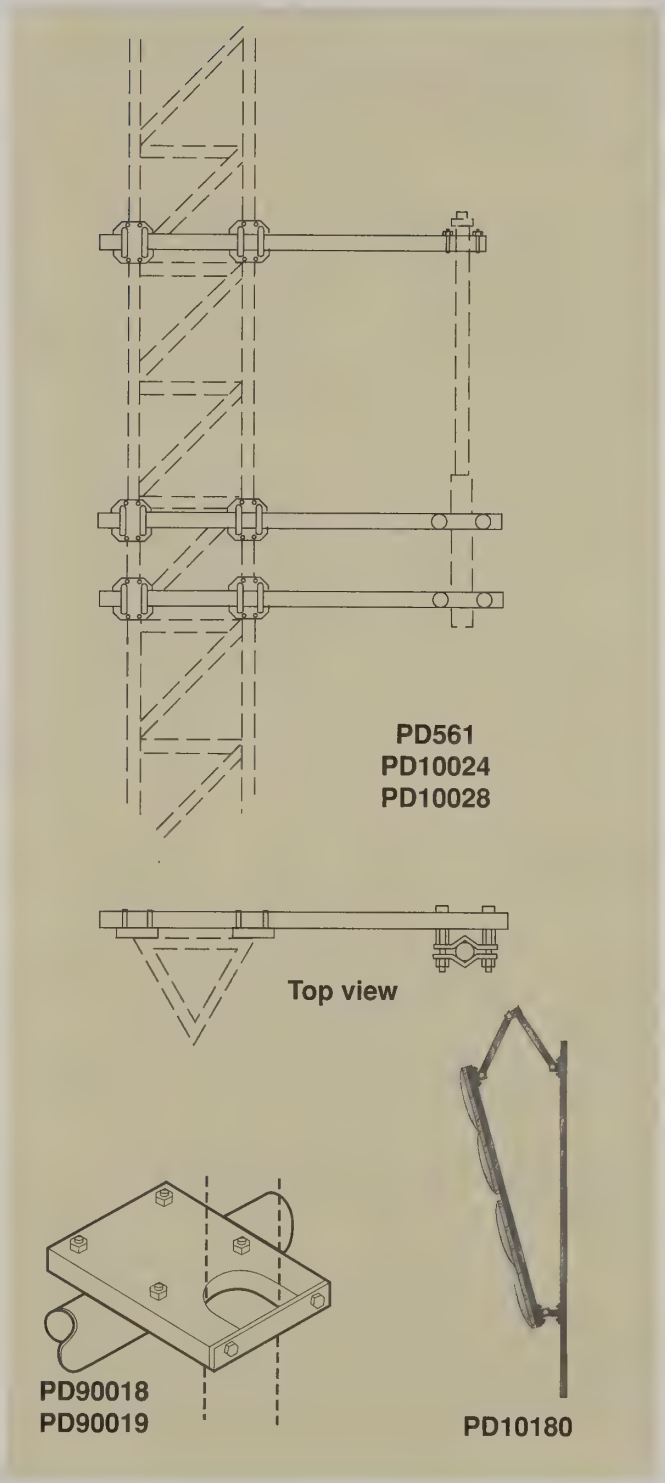
PD90018 - Insulated Adjustable Upper Support. An insulated upper support that clamps directly using a G-10 fiberglass insulator. This type of attachment is necessary when mounting antennas with non-tapering radomes. The PD90018 attaches to square or triangular towers having round legs up to 2-3/8 in. (60 mm) in diameter. Two pieces PD237 crossover plates are supplied for attachment to tower. The PD90018 positions antennas from 6 in. (152 mm) to 3 ft. (0.91 m) away from a tower having face dimensions ranging between 1 ft. (0.3 m) and 2 ft. (0.6 m). Net wt. 12 lbs. (5.44 kg). Shipping volume 1.0 ft.³ (.029 m³). UPS shippable.

PD90019 - Insulated Adjustable Upper Support (Long). Same as PD90018 except supports antennas from 6 in. (152 mm) to 7 ft. (2.1 m) away from tower. Net wt. 20 lbs. (9.07 kg). Shipping volume 1.59 ft.³ (.045 m³).

Tilt Mount Kit

PD10180 - Galvanized steel, scissor-clamp mechanism permits downtilting of antenna to 30 degrees. Mounts on support pipe or tower leg 3 in. (73 mm). Suitable for all panel-style antennas and PD1132. Net wt. 67 lbs. (30 kg). Shipping volume 2.75 ft.³ (.082 m³).

PD10206 - Adapter Plate Kit for Tilt Mount. For tower leg 3-1/2 in. (88.9 mm) to 4-1/2 in. (114.3 mm). Net. wt. 30 lbs. (13.5 kg). Shipping volume .5 ft.³ (0.14 m³).



Side Mounts for Large Tower Legs

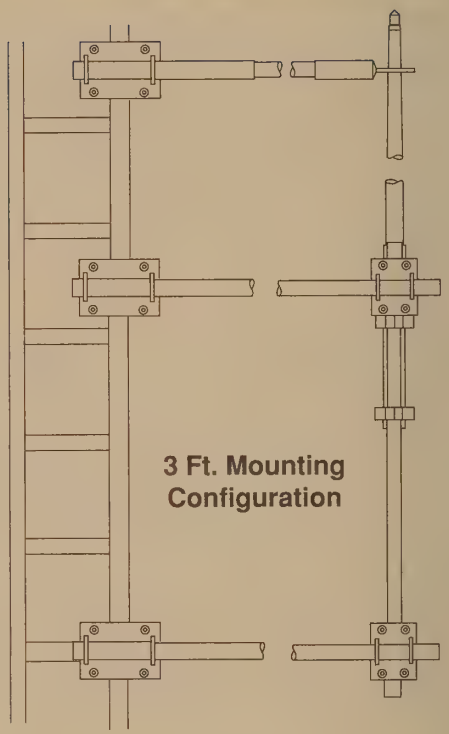
Antenna Side Mounting Hardware is available for towers with legs from 3 inches O.D. to 6 inches O.D. Two side mounting styles are available. One for side mounting an antenna up to 3 feet from the tower, and the other for side mounting the antenna a fixed distance of 6 feet.

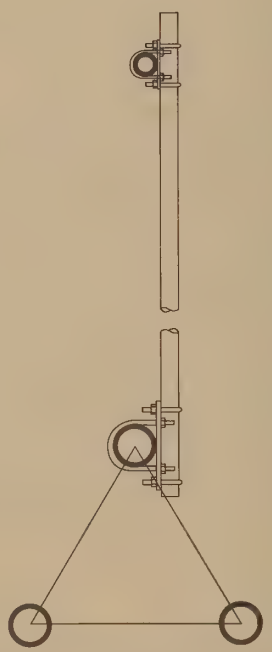
Side Mounts for Tower Legs 3.0, 3.5 or 4.0 inches O.D. mounted up to 3 feet away.
The PD10118, PD10120, PD10128, PD10136, PD10140, PD10144, PD10148 and PD10152 Side Mount Assemblies include hardware for side mounting antennas up to 3 feet away from towers with legs 3.0, 3.5 or 4.0 inches O.D. All side mounts consist of an insulated upper support arm and a grounded lower support system.

Side Mounts for Tower Legs 3.0, 3.5 or 4.0 inches O.D. mounted 6 feet away.
The PD10116, PD10121, PD10124, PD10126, PD10138, PD10142, PD10146, PD10150 and PD10154 Side Mount Assemblies include hardware for side mounting antennas a fixed 6 feet from the tower legs 3.0, 3.5, or 4.0 inches O.D. All side mounts consists of an insulated upper support arm and a grounded lower support system. A single tie back is used for extra mechanical stability. The maximum face spread for the tie back assembly is 8.5 feet.

Side Mounts for Tower Legs 4.0 or 6.0 inches O.D. mounted up to 3 feet away.
The PD10119, PD10122, PD10129, PD10137, PD10141, PD10145, PD10149 and PD10153 Side Mount Assemblies include hardware for side mounting antennas up to 3 feet away from towers with legs 5.0 or 6.0 inches O.D. All side mounts consist of an insulated upper support arm and a grounded lower support system.

Side Mounts for Tower Legs 4.0 or 6.0 inches O.D. mounted 6 feet away.
The PD10117, PD10123, PD10125, PD10127, PD10139, PD10143, PD10147, PD10151 and PD10155 Side Mount Assemblies include hardware for side mounting antennas a fixed 6 feet from the tower with legs 5.0 or 6.0 inches O.D. All side mounts consist of an insulated upper support arm and a grounded lower support system. A single tie back is used for extra mechanical stability. The maximum face spread for the tie back assembly is 8.5 feet.





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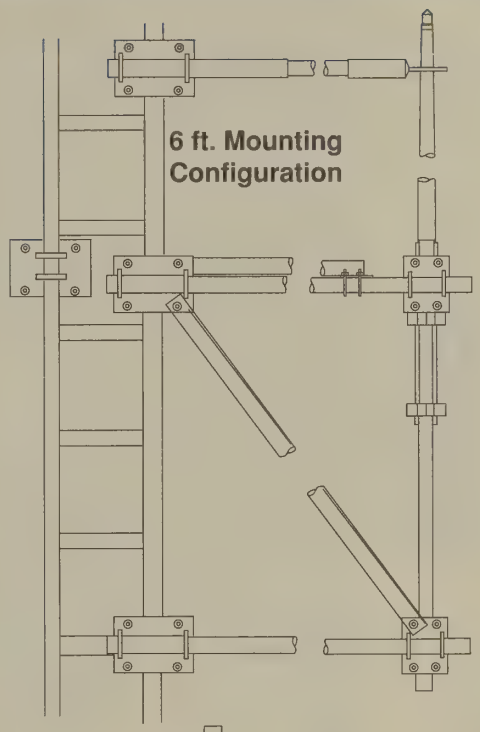
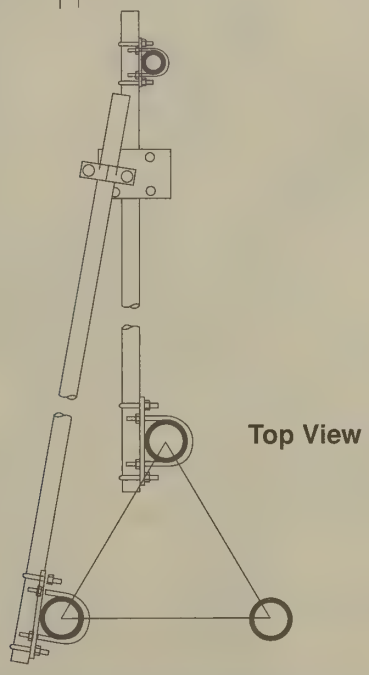
Side Mounts for Large Tower Legs

Side Mount Assemblies: Large Legs

ANTENNA	Tower Legs 3 to 4 inches O.D. 3 Ft. Off	6 Ft. Off	Tower Legs 4 to 6 inches O.D. 3 Ft. Off	6 Ft. Off
PD79	10140	10142	10141	10143
PD83	10140	10142	10141	10143
PD114	10140	10142	10141	10143
PD128	10140	10142	10141	10143
PD152	10140	10142	10141	10143
PD200	10118	10116	10119	10117
PD201	10128	10126	10129	10127
PD207	10140	10142	10141	10143
PD220	10120	10121	10122	10123
PD340	10140	10142	10141	10143
PD345	10140	10142	10141	10143
PD400	10144	10146	10145	10147
PD440	10140	10142	10141	10143
PD453	10140	10142	10141	10143
PD455	10120	10121	10122	10123
PD458	10136	10138	10137	10139
PD620	—	10124	—	10125
PD755	—	10124	—	10125
PD1107	10140	10142	10141	10143
PD1108	10136	10138	10137	10139
PD1109	10136	10138	10137	10139
PD1110	10136	10138	10137	10139
PD1150	10148	10150	10149	10151
PD1151	10152	10154	10153	10155
PD1610	10140	10142	10141	10143
PD10017	10136	10138	10137	10139
PD10022	10140	10142	10141	10143
PD10036	10128	10126	10129	10127
PD10037	10144	10146	10145	10147





Power Divider Harnesses

For Multiple Antenna Arrays

In most cases standard antennas listed in this catalog will cover the required service areas of two-way radio systems. However, a combination of two or more antennas may be required to achieve higher gains or special pattern shapes.

For example, where more gain is required than can be produced by a single antenna, two, four, or more of these antennas may be stacked and fed in phase. Since the number of antennas is doubled, the gain of the array may increase by approximately 3 dBd minus the cable losses.

When ordering power divider harnesses, the exact frequency of operation must be specified as well as the Celwave catalog number of the antennas to be stacked.

To maximize the antenna array's performance, the antennas and harnesses should be purchased on the same order if possible so that the system may be checked in our production laboratory before shipment.

Additional jumpers of RG214, RG393 or LLF cable with mating connectors are available.

Please contact our Customer Service Department for assistance in determining your optimum harness arrangement. We require the following information:

1. Model number of antennas in array and frequency range.
2. Distance antennas will be separated when mounted.

2 Way Power Dividers

20-400 MHz **0233760XX (formerly PD278), PD279**

The 0233760XX Power Divider Harness is designed to divide a single cable to feed two antennas operating within the 20-400 MHz frequency range. Each "leg" is made of RG11A/U type cable measuring only 12 inches (305 mm) long (@ 150 and 400 MHz only). Additional jumper cabling may be necessary to reach each antenna. Each jumper must be of equal lengths to properly phase and match each antenna. The two output terminations are N-female, the single input connector is N-male. Power handling 500 watts max.

The PD279 Power Divider Harness is comprised of three 0233760XX power dividers. Four antennas may be fed using this divider. Specify frequency band when ordering.

806-980 MHz

The PD10071 Power Divider Harness has a transformer section designed to properly match antennas operating over the 800-980 MHz frequency range. It features RG214B/U double shielded cable with type N-male output terminations and a type N-male input termination.

Ordering Information
2, 3 and 4 Way Dividers

Item No.	Ports	Freq. Range	Size
PD10079	2-Way	406-512	7.5" x 0.5 dia.
PD10072	2-Way	800-980	5.0" x 0.5 dia.
PD10075	3-Way	406-512	6.5" x 0.5 dia.
PD10076	3-Way	800-980	4.0" x 0.5 dia.
PD10077	4-Way	406-512	6.5" x 0.5 dia.
PD10078	4-Way	800-980	4.0" x 0.5 dia.

Note: Above dividers all ports N-female. LC male input connector for high power optional.

023376003	20-30 MHz
023376004	25-40 MHz
023376005	40-60 MHz
023376006	50-80 MHz
023376007	65-110 MHz
023376008	75-115 MHz
023376009	90-150 MHz
023376010	110-180 MHz
023376011	140-210 MHz
023376012	150-255 MHz
023376013	185-305 MHz
023376014	265-305 MHz
023376015	345-400 MHz

Transmission Line

Transmission Line

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INTERNATIONAL:

Tel: 1-908/462-1880 Fax: 1-908/431-8388

TECHNICAL SUPPORT:

Tel: 800/659-1880 Fax: 1-908/462-6919

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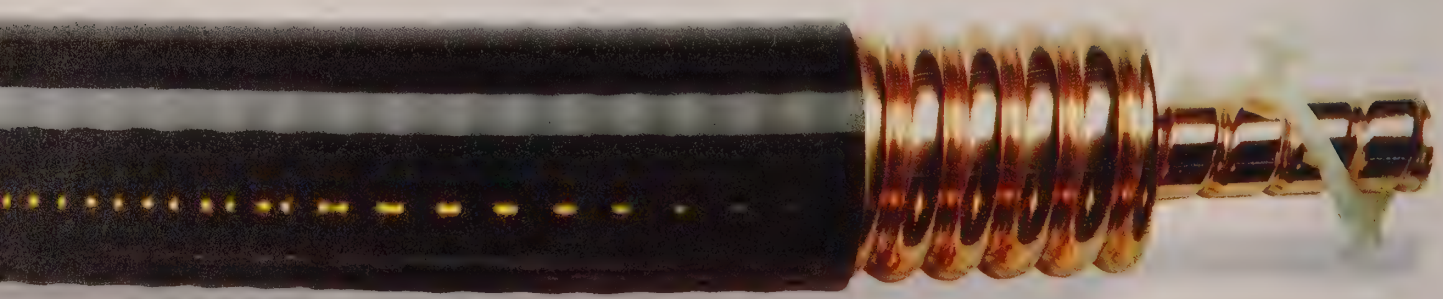
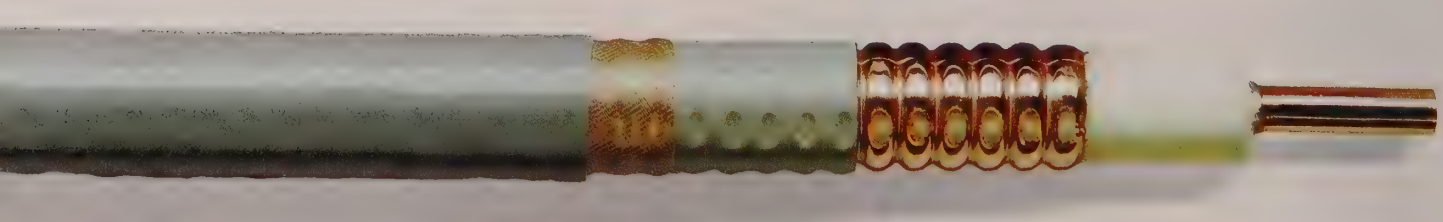
Celwave is a division of Radio Frequency Systems, Inc., the company that has been synonymous with innovations in transmission line products for years. We introduced sequential cable markings, designed the self-flaring, double O-ring connector, perfected foam dielectric and, most recently, announced the best environmental protection yet developed for cable connections. Whether your need is for cable, connectors or accessories, we are your global source for precisely engineered and manufactured products that assure your communications system's integrity from top to bottom and everywhere in between.

FLEXWELL® FOAM DIELECTRIC COAXIAL CABLE ◦ Maximizes system performance ◦ Preserves signal to noise ratio of antenna system ◦ Assures system reliability.



FLEXWELL® AIR DIELECTRIC COAXIAL CABLE ◦ Maximizes system performance ◦ Maintains performance through seasonal extremes ◦ Easy handling. environmentally stable.



FLEXWELL® RADIATING COAXIAL CABLE ◦ Broadband Capabilities ◦ Continuous Coverage ◦ Controlled Area Coverage ◦ Flexibility in Coverage ◦ System Compatibility.

FLEXWELL® Foam Dielectric Coaxial Cable

These cables use a proprietary, closed cell foam dielectric that provides the low loss performance associated with air dielectric cables, but with none of the pressurization problems. Their excellent intermodulation performance, weatherproof qualities, crush resistance and high tensile strength have made them the most popular design in the world for cellular and land mobile applications. FLEXWELL foam cables are available in 1/4", 1/2", 7/8", 1 1/4" and 1 5/8" diameters with fire retardant outer jackets if required. Inner conductors are solid copper, copper clad aluminum, smoothwall or corrugated copper tube depending on the diameter. All cable assemblies are inspected and electrically tested to confirm their performance prior to shipment.

LLFLEX®: For maximum flexibility.

The design of this cable enables it to withstand repeated bending in the tightest of areas. Because of these easy handling and routing characteristics, LLFLEX is an ideal choice for use as equipment jumper cables. In addition, it is highly suitable for applications where RF screening efficiency, intermodulation protection, imperviousness to moisture and mechanical strength are required. It is available with or without a fire retardant jacket in 1/4" and 1/2" diameters.

FLEXWELL® Air Dielectric Coaxial Cable

These cables offer a remarkable combination of flexibility, strength and superior performance. Because of their better uniformity, lower attenuation and improved mechanical stability,they are used extensively in high power, land mobile applications from 25-2500MHz. Available in 1/2", 7/8", 1 5/8" and 3" diameters, their design includes a spiral polyethylene dielectric, a corrugated outer conductor and a black polyethylene outer jacket. A fire retardant jacket is available on all sizes if required.

FLEXWELL® Radiating Coaxial Cable

The low loss, broadband capability and construction of these cables enable them to perform as a distributed antenna system as well as a transmission line. In applications such as tunnels, building complexes and airports, where the propagation of RF energy from a discrete antenna is either hindered or impossible, a signal transmitted near the cable will couple into slots cut in its outer conductor and be carried along the cable's entire length. FLEXWELL radiating cables are used for both one-way and two-way communications systems. Power handling capabilities range from 350 to 4300 Watts with attenuation from 1.3dBd to 7.5dBd. They combine high strength and flexibility for ease of installation in tight places and allow frequency reuse in scarce spectrums. They are available with or without a fire retardant jacket in 1/4", 3/8", 1/2", 7/8", 1 1/4" and 1 5/8" diameters.

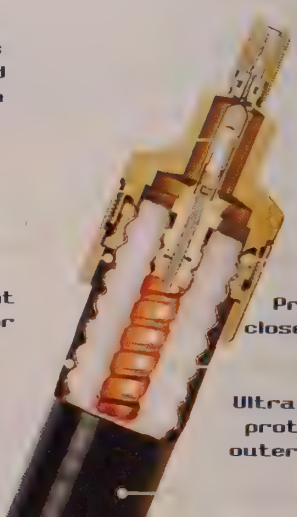
LLFLEX® Superflexible foam cable

All Celwave connectors meet both

U.S and international standards

All Celwave connectors are available with silver-plated

bodies and gold center pins. Contact Celwave Sales Engineering.



CELWAVE Connectors

Our N-type connectors are the equivalent of other, premium priced connectors and allow installers to save time while making error-free assemblies. They are solderless, require no flaring and can be attached with everyday hand tools. Their unique, double O-ring design makes them totally water-proof and their center conductor contact alignment feature is widely considered to be fail safe.

All Celwave connectors meet both U.S. and international standards and are tested with TDR as well as frequency domain measurements to insure careful matching. They are normally supplied with a tough, shrink-fit polyolefin sleeve to provide extra environmental protection. In addition to N-type male and female, we also offer a complete selection of UHF, EIA and 7/16 DIN connectors. The latter have been developed to serve a wide variety of applications in the emerging GSM infrastructure and wherever else higher intermodulation is desired. Upon request, we will factory install the connectors required for your application prior to shipment of your cable. All Celwave connectors are available with silver-plated bodies and gold center pins.

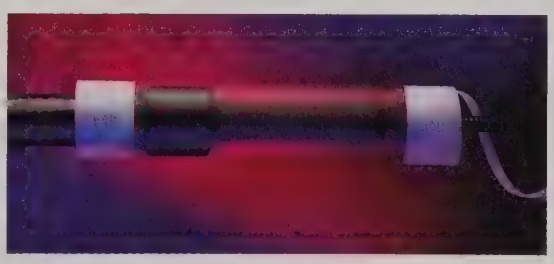
7/16 Din Connectors

Order Number	Connector Type	Contact Type	Length	Outer Diameter
734830	S-FLC12 716 IEC M	Solder	2.523"	0.675"
734831	S-FLC12 716 IEC F	Solder	2.556"	0.675"
734832	S-FLC12 716 IEC M	Basket	2.525"	0.875"
734833	S-FLC12 716 IEC F	Basket	2.558"	0.875"
734730	FLC12 716 IEC M	Basket	2.639"	1.00"
734730	FLC12 716 IEC M	Basket	2.639"	1.00"
734737	FLC78 716 IEC M	Threaded	2.468"	1.442"
734756	FLC78 716 IEC F	Threaded	2.430"	1.442"
734733	FLC114 716 IEC M	Threaded	3.510"	2.00"
734734	FLC114 716 IEC F	Threaded	3.510"	2.00"
734755	FLC138 716 IEC M	Threaded	4.070"	2.50"
734736	FLC138 716 IEC F	Threaded	4.070"	2.50"

The Great Seal™

This is positively the best environmental protection ever devised for cable connections and it retains its effectiveness through years of aging and exposure. Each rubber sleeve is factory expanded and mounted on a removable plastic core.

Simply slip it over a cable connection and pull out the plastic support coil. Even when the temperature is below freezing, it instantly squeezes into a tight, form-fitting sleeve that stops water migration cold. No heat shrinking, no cutting, no taping, no blisters. The Great Seal saves hookup time on every installation while eliminating variations produced by different individuals applying tape and liquid sealants.



Celwave supplies everything you need to complete your installation. No time lost due to split shipments or multiple purchase orders.

CABLE INSTALLATION ACCESSORIES

LLFLEX™12 Jumper cables: This highly flexible, foam dielectric cable features a low loss dielectric and a solid sheath outer conductor for excellent shielding and a bending radius of 1.17" (30mm). Used primarily to connect an antenna's termination to a semi-rigid, solid shielded transmission line, these cables are also used to connect duplexers, receiver multicouplers, transmitter combiners and other system components to the same transmission line. Four standard lengths of 18", 36", 72" and 96" are available. For non-standard lengths, please contact our Customer Service Department.

Stainless Steel Strapping Kit: Includes 100' of 1/2" wide special alloy stainless steel, a tightening buckle for each foot of tape and a set of installation tools. **#910061-000**

The Great Seal: A cold shrink rubber seal expanded on a plastic coil support, which is easily removed, to make a tight, form-fitting barrier that totally stops water migration.

Kit Order #	A Coax	mated to	B Coax
CS-1	7/8"		1/2"
CS-2	1 1/4"		1/2"
	1 5/8"		1/2"
CS-5	1/2"		1/2"
CS-6	7/8"		7/8"
CS-7	1 1/4"		1 1/4" or 1 5/8"
	1 5/8"		1 1/4" or 1 5/8"

Nylon Cable Tie Kit: 50, Heavy duty, black, weather resistant straps for attaching 1/2"-7/8" cable directly to tower members. Maximum spacing 3 feet(914mm). Maximum bundle diameter including tower member is 8 inches(203mm). **#PD10057**

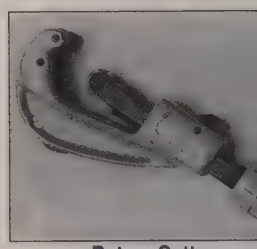
Rotary Cutter: Improves connector installation. For cable up to 1 1/4" diameter. Built-in blade. Quick release jaws. **#PD151**

Cable Grounding Clamp: All stainless steel assembly for use in grounding 1/2" (12.7mm) and 7/8" (22.2mm) cables. A split bolt attachment is provided for a No. 6 ground wire (not supplied). Sold in packages of three. **#PD477**

Polyken Tape: A 3/4" (19mm) wide by 20 foot (6.1m) long roll of black, all weather PVC electrical tape. Sold in packages of ten rolls. **#PD275**

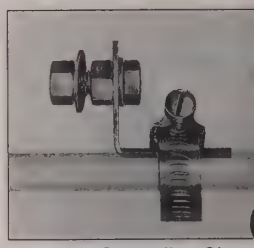
Lightning Arrestors: Easily installed to minimize risk to costly radio equipment.

Specifications	PD593	PD395
Termination (Both ends)	UHF Female	Type N (F)
Power Rating	1 kilowatt	500 Watts
Breakdown Voltage	500 V. Min. 2000 V. Max.	500 V. Min. 2000 V. Max.
VSWR	Under 1.03:1 to 500 MHz	1.1:1 to 1000 MHz
Insertion Loss	Less than .05 dB	Less than .05 dB

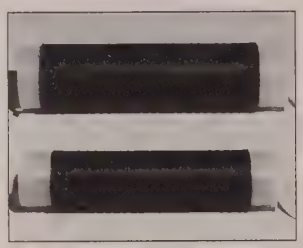


Rotary Cutter

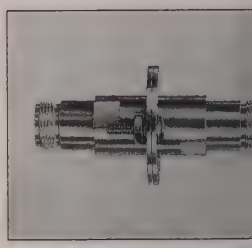
Stainless Steel Strapping Kit



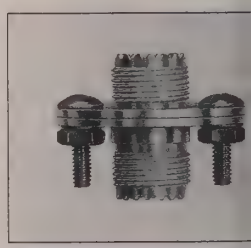
Cable Grounding Clamp



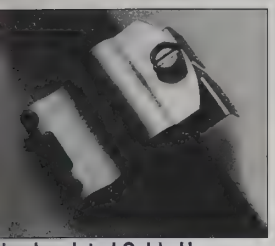
The Great Seal



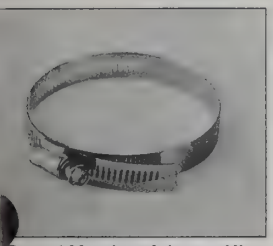
Lightning Arrestor N(F



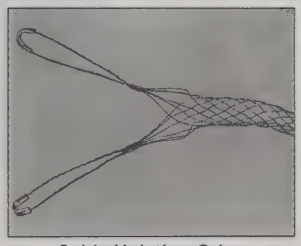
Lightning Arrestor UHF Fe



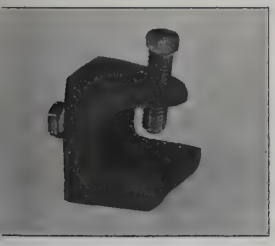
Non Insulated Cable Hangers



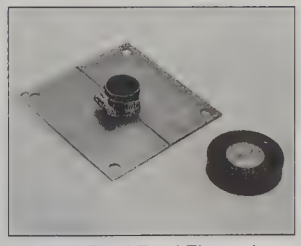
Round Member Adapter Kit



Cable Hoisting Grips



Angle Member Adapter Kit



Wall/Roof Feed Through

Cable Grounding Kits

Straps for Copper Sheathed Cables: Used to affix FLC and LLF cable to interior wall surfaces. Available as double hole strap for 1/2 " (12.7mm) or 7/8" (22.2mm) jacketed cable. **#'s PD176-514C (1/2"), PD176-516C (7/8").**

Non Insulated Cable Hangers: Corrosion resistant stainless steel. May be attached using an angle or round member adapter. Recommended spacing: every 3 feet (1m). Ten hangers per kit.

Cable Dia. in. (mm)	Ordering no. w/ slot for round member adapter	Ordering no. w/out slot for angle member adapter
1/2 (12.7)	**920981-010**	**920981-010**
7/8 (22.2)	**920396-000**	**NA**
1 1/4 (31.8)	**920393-000**	**NA**
1 5/8 (41.3)	**920159-003**	**920691-003**

Round Member Adapter Kit: Stainless steel hose clamp for mounting non-insulated cable hangers to round members. Ten adapters per kit.

Member Diameter - in. (mm)	Ordering Number
1 to 2 (25-51)	**514542-001**
2 to 3 (51-76)	**514542-002**
3 to 4 (76-102)	**514542-003**
4 to 5 (102-127)	**514542-004**
5 to 6 (127-152)	**514542-005**
6 to 7 (152-178)	**514542-006**

Angle Member Adapter Kit: Fastens non-insulated cable hangers to angle members without drilling. Ten adapters per kit.

Ordering Number	Hanger Type in (mm)	Jaw Opening in. (mm)
920167-001	1/2 (12.7)	3/4 (19.1)
920167-004	7/8 to 3 1/2 (22.2-88.9)	7/8 (22.2)

Cable Grounding Kits: For 1/2" (12.7mm), 7/8" (22.2mm) , 1 1/4" (31.75 mm) and 1 5/8" (41.3mm) cable. One grounding kit is recommended near the tower base and one at the top of the cable run. Kit consists of cable clamp, 2 ft copper strap and lug, sealing compound and tape. **#'s 713796-003 (1/2"), 713796-005 (7/8"), 713796-007 (1 1/4"), 713796-008 (1 5/8").**

Cable Hoisting Grips: For 1/2" (12.7mm), 7/8" (22.2mm), 1 1/4"(31.75 mm) and 1 5/8" (41.3mm) cable. Grips are split type and may be affixed with supplied lacing. Recommended intervals are 200 ft. (60m). Grips may be left on tower as top hanger if desired. **#'s 910303 (1/2"), 910307 (7/8"), 915158 (1 1/4"), 910311 (1 5/8").**

Wall/Roof Feed Through: Galvanized steel. Includes plastic sealing compound.

Cable Diameter in. (mm)	Ordering Number
1/2 (12.7)	**920432-002**
7/8 (22.2)	**920433-000**
1 1/4 (31.7)	**920867-000**
1 5/8 (41.3)	**920434-000**

CABLE INSTALLATION ACCESSORIES (CONT.)

Plate Reducer: Quick step type. Male inner connectors on both ends. "O" rings and hardware included for both ends.

Ordering Number	920247	920248
Size - in.	1 5/8-7/8	3 1/8-1 5/8
Imp. - Ohms	50	50
Dimensions - in. (mm)		
A	3/4 (19.0)	7/8 (22.2)
B	3-1/2 (88.9)	5-3/16 (131.8)
Weight - lbs. (kg)		
Net	3.0 (1.36)	5.0 (2.27)
Shipping	3.6 (1.63)	5.8 (2.63)

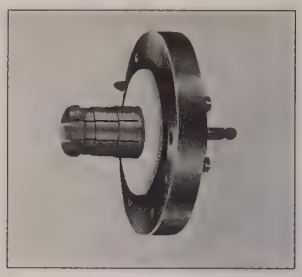
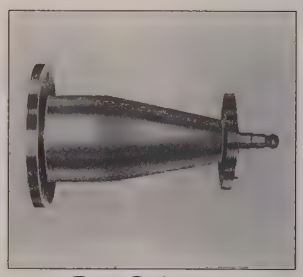


Plate Reducer

Taper Reducer: Low VSWR (1.05 @ 1.0 GHz). Fixed flange large end, swivel flange small end. Unsupported inner conductor. Removable anchor inner conductor, "O" ring and hardware included for smaller size flange only.

Ordering Number	920249	920250
Size - in.	1 5/8-7/8	3 1/8-1 5/8
Imp. Ohms	50	50
Dimensions - in. (mm)		
A	4-27/64 (112.3)	7-3/32 (180.0)
B	3-1/2 (88.9)	5-3/16 (131.8)
C	2-1/4 (57.2)	3-1/12 (88.9)
Weight - lbs. (kg)		
Net	1.75 (0.8)	4.1 (1.9)
Shipping	2.4 (1.1)	5.0 (2.3)



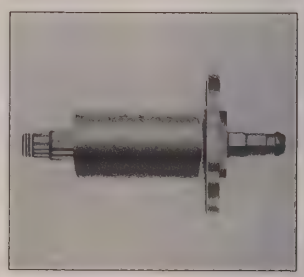
Taper Reducer

Adapter: EIA to type N-female with anchor inner connector. Mates with UG21/U. Gas tight with 1/8" FPT pressure inlet and plug.

Ordering Number	920241	920242	920243
Size - in.	7/8	1 5/8	3 1/8
Imp. - Ohms	50	50	50
Dimensions - in. (mm)			
A	3 5/8 (92.0)	5 (127.0)	6 (152.4)
B	2 1/4 (57.2)	3 1/2 (88.9)	5 3/16 (131.8)
Weight - lbs. (kg)			
Net	.6 (.3)	2.0 (.9)	6.0 (2.7)
Shipping	.9 (.4)	2.7 (1.2)	6.8 (3.1)

Adapter: EIA to LC female with anchor inner connector. mates with UG154/U.

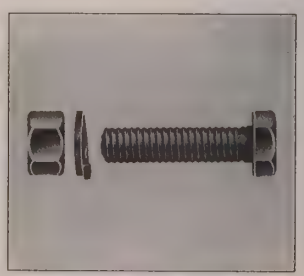
Ordering Number	920244	920245	920246
Size - in.	7/8	1 5/8	3 1/8
Imp. - Ohms	50	50	50
Dimensions - in. (mm)			
A	3 3/4 (95.3)	5 1/4 (133.4)	5 7/16 (138.1)
B	2 1/4 (57.2)	3 1/2 (88.9)	5 3/16 (131.8)
Weight - lbs. (kg)			
Net	1.2 (.5)	3.5 (1.6)	6.3 (2.9)
Shipping	1.4 (.6)	4.2 (1.9)	7.1 (3.2)



Adapter- EIA to type N-female

Stainless Steel Mounting Hardware:

Ordering Number	920272	920273	920274
Size - in.	7/8	1 5/8	3 1/8
Qty. per set	3	4	6
Dimensions - in. (mm)			
A	7/16 (11.1)	1/2 (12.7)	9/16 (14.3)
B	1 (25.4)	1 1/2 (38.1)	1 1/2 (38.1)
C (Thread)	1/4-20 UNC	5/16-18 UNC	3/8-16 UNC
Ordering Number	**926222**	**920275**	**926285**
Size - in.	4 1/16	6 1/8	9 3/16
Qty. per set	8	12	20
Dimensions - in. (mm)			
A	9/16 (14.3)	9/16 (14.3)	9/16 (14.3)
B	1 1/2 (38.1)	1 3/4 (44.5)	2 1/4 (57.1)
C (Thread)	3/8-16 UNC	3/8-16 UNC	3/8-16 UNC



Stainless Steel Mounting Hardware

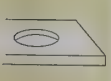
DIATING CABLE ACCESSORIES

diating cables take all standard connectors and cable accessories. e following are specific to radiating cable applications.

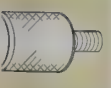
Self Locking Hanger Kits: A one-piece, automatic, self-locking unit of corrosion resistant, non-halogenated Nylon 12 material offering high tensile strength and many hanging configurations.

Kit order # (10 pcs)	Radiating Cable Size & Type	Hanger ft	Spacing (m)
915620-008	1/4" J,JFR	5	(1.5)
915620-010	1/4" JFRT, 3/8" J, JFR	5	(1.5)
915620-012	3/8" JFRT, 7/16" J, JFR	5	(1.5)
915620-015	7/16" JFRT, 1/2" J, JFR	5	(1.5)
915620-017	1/2" JFRT	5	(1.5)
915620-025	7/8" J, JFR	5	(1.5)
915620-028	7/8" JFRT	5	(1.5)
915620-036	1 1/4" J, JFR, JFRT	7	(2.1)
915620-047	1 5/8" J, JFR, JFRT	7	(2.1)

2" Nylon 12 Standoff: For spacing hanger 2" from mounting surface. Includes stainless steel screw kit. **#915622**

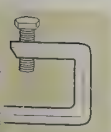


Stainless Steel Flange Insert: Used with hanger to accept 1/4"-20 threaded rod. **#915624**

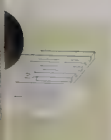


1/4" to 3/8" Adapter: For attaching 3/8" rod to flange insert; stainless steel. **#915626**

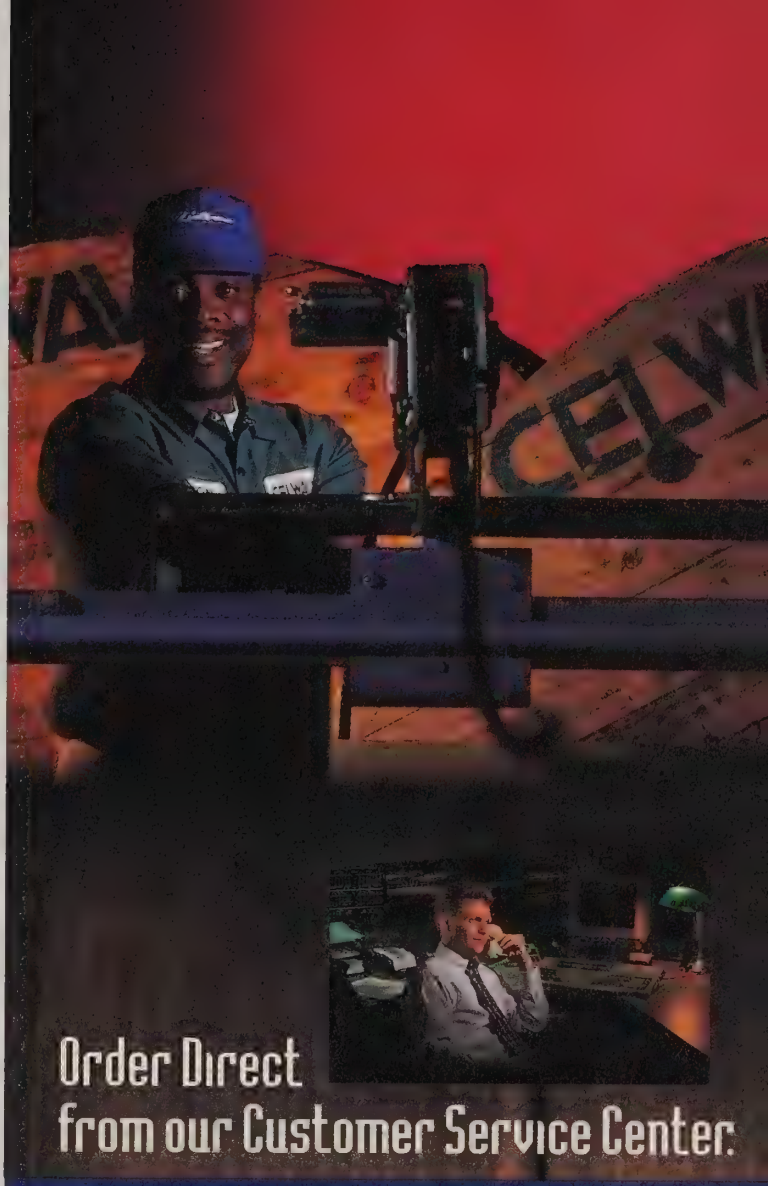
1/4"-20 x 1/2" Threaded Stud: For attaching flanges of two hangers together; stainless steel. **#915628**



1/4" Angle Adapter: Used to mount hangers to beam, has two 1/4"-20 threaded holes. **#915627**



Strut Adapter: Used to attach hanger to mounting strut. Includes stainless steel screw kit. **#915630**



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Foam and Air Dielectric

	Name	Flexwell® LLFlex Foam		
Description	Size	1/4"	1/2"	1/2"
	Cable Type	S-FLC14-50J	S-FLC 12-50J	FLC 12-50J
	Order No.	811028-001	811026-001	810918-001
	Flame Retardant No.	811028-007	811026-007	810918-007
Electrical Characteristics	Impedance: Ohms	50	50	50
	Velocity of Propagation: %	84	81	88
	Maximum Freq. 90% fco GHz	22.3	10.2	8.0
	Attenuation dB/100 ft. (dB/100m)			
	30MHz	.98 (3.22)	.56 (!.8)	.37 (1.21)
	400MHz	3.70 (12.1)	2.18 (7.1)	1.40 (4.59)
	1000MHz	6.0 (19.7)	3.58 (11.7)	2.30 (7.54)
	Average Power kW @ 40c° Ambient			
	30MHz	1.28	3.78	5.0
	400MHz	.33	0.98	1.3
	1000MHz	.20	0.59	.80
Mechanical Characteristics	Center Conductor O.D.- in.(mm)	.074 (1.87)	.14 (3.5)	.189 (4.8)
	Outer Conductor O.D.- in.(mm)	.253 (6.42)	.48 (12.2)	.547 (13.9)
	Jacket O.D.- in.(mm)	.30 (7.62)	.53 (13.4)	.640 (16.3)
	Minimum Bending Radius- in.(mm)	1.00 (25)	1.25 (32.0)	5.0 (127)
	Cable Weight: lbs/ft.(kg/m)	.045 (.067)	.15 (.22)	.165 (.251)

Radiating Cables

	Size	1/4"	3/8"	1/2"
Description	Cable Type & Ordering Number			
	Buriable Version	R-FLC14-50J/811041-001	R-FLC38-50J/811032-001	R1-FLC12-50J/8110
	Flame Retardant Type CATVX	R-FLC14-50JFR/811041-003	R-FLC38-50JFR/811032-003	R1-FLC12-50JFR/811
	Flame Retardant Type CATVR (riser)	R-FLC14-50JFRT/811041-007	R-FLC38-50JFRT/811032-007	R1-FLC12-50JFRT/81
Electrical Characteristics	Impedance: ohms	50	50	50
	Velocity of Propagation: %	84	88	88
	DC Breakdown: volts	1600	2500	4000
	30 MHz			
	Attenuation dBd/100 ft. (dBd/100m)			
	measured 1/2" from Concrete	1.1 (3.61)	0.65 (2.13)	0.33 (1.08)
	measured 2" from Concrete	1.1 (3.61)	0.63 (2.13)	0.35 (1.15)
	Coupling Loss at 20ft., dB ± 10 dB	50	65	62
	Average Power Rating, kW	1.28	2.1	5.14
	Typ. VSWR	1.3	1.3	1.3
	150 MHz			
	Attenuation dBd/100 ft. (dBd/100m)			
	measured 1/2" from Concrete	2.7 (8.86)	1.6 (5.25)	0.94 (3.08)
	measured 2" from Concrete	2.7 (8.86)	1.5 (4.9)	0.98 (3.22)
	Coupling Loss at 20ft., dB ± 10 dB	58	56	58
	Average Power Rating, kW	0.56	0.92	2.24
	Typ. VSWR	1.3	1.3	1.3
	450 MHz			
	Attenuation dBd/100 ft. (dBd/100m)			
	measured 1/2" from Concrete	6.0 (19.7)	3.0 (9.84)	2.1 (6.89)
	measured 2" from Concrete	5.1 (16.7)	2.6 (8.5)	2.0 (6.56)
	Coupling Loss at 20ft., dB ± 10 dB	62	61	63
	Average Power Rating, kW	0.32	0.51	1.25
	Typ. VSWR	1.3	1.3	1.3
	900 MHz			
	Attenuation dBd/100 ft. (dBd/100m)			
	measured 1/2" from Concrete	10.0 (32.8)	4.3 (14.1)	3.4 (11.2)
	measured 2" from Concrete	7.1 (23.0)	3.7 (12.1)	2.9 (9.50)
	Coupling Loss at 20ft., dB ± 10 dB	69	68	68
	Average Power Rating, kW	0.22	0.35	0.86
	Typ. VSWR	1.3	1.3	1.3
	1700 MHz			
	Attenuation dBd/100 ft. (dBd/100m)			
	measured 1/2" from Concrete	15.8 (51.8)	6.3 (20.7)	5.6 (18.4)
	measured 2" from Concrete	9.7 (32.0)	5.3 (17.4)	4.0 (13.1)
	Coupling Loss at 20ft., dB ± 10 dB	71	74	73
	Average Power Rating, kW	0.15	0.24	0.60
	Typ. VSWR	1.3	1.3	1.3
Mechanical Characteristics	Diameter Over Jacket, maximum in. (mm)			
	J Suffix	0.31 (7.8)	0.46 (12)	0.65 (16)
	JFR Suffix	0.35 (8.9)	0.46 (12)	0.65 (16)
	JFRT Suffix	0.44 (11)	0.52 (13)	0.73 (19)
	Diameter Over Outer conductor, in. (mm)	0.25 (6.4)	0.38 (9.7)	.547 (13.9)
	Minimum Bending Radius, in. (mm)	1.0 (25)	3.75 (95)	5.0 (125)
	Cable Weight, lb/ft (Kg/m)			
	J Suffix	0.06 (0.09)	0.09 (0.13)	0.16 (0.23)
	JFR Suffix	0.08 (0.12)	0.10 (0.15)	0.18 (0.26)
	JFRT Suffix	0.10 (0.15)	0.11 (0.17)	0.22 (0.33)
	Tensile Strength, lb(N)	150 (667)	250 (1100)	300 (1334)

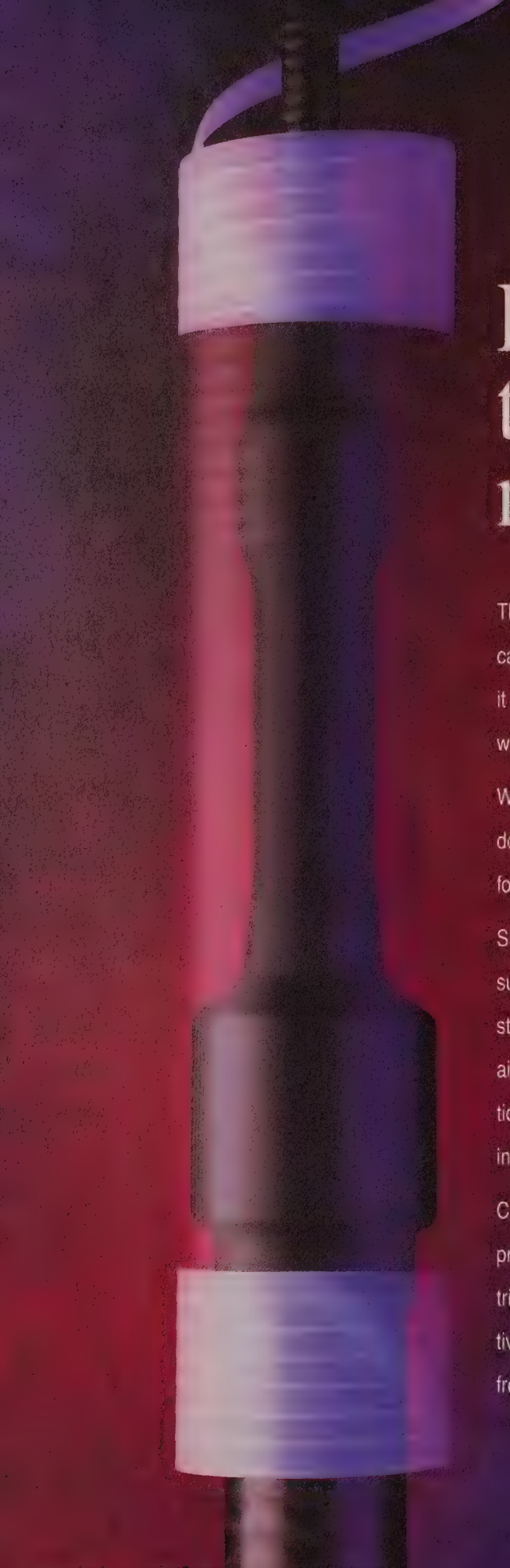
Flexwell® Foam			Flexwell® Air Dielectric			
/8"	1 1/4"	1 5/8"	1/2"	7/8"	1 5/8"	3"
8-50J	FLC 114-50J	FLC 158-50J	HCC 12-50J	HCC 78-50J	HCC 158-50J	HCC 300-50J
001	810916-001	810920-001	810901-001	810929-001	810903-001	810905-001
1-007	810916-007	810920-007	———	———	———	———
0	50	50	50	50	50	50
8	88	88	91.5	91.5	95	96
.0	3.4	2.7	11.3	5.13	2.74	1.63
(.65)	.150 (.49)	.118 (.39)	.455 (1.49)	.202 (.66)	.110 (.36)	.075 (.24)
2.62)	.61 (2.0)	.48 (1.57)	1.72 (5.64)	.783 (2.56)	.417 (1.36)	.270 (.89)
(4.49)	1.05 (3.44)	.87 (2.85)	2.79 (9.15)	1.29 (4.23)	.699 (2.29)	.454 (1.43)
0.5	18	23	3.7	13.0	29.0	70.0
.8	4.0	5.2	.98	3.3	7.8	17
.7	2.4	3.0	.61	2.1	4.9	9.15
(9.07)	.530 (13.46)	.680 (17.27)	.160 (4.06)	.354 (8.99)	.732 (18.6)	1.150 (29.2)
25.14)	1.418 (36.02)	1.83 (46.48)	.484 (12.29)	1.00 (25.4)	1.830 (46.4)	2.850 (72.3)
(28.50)	1.58 (40.13)	2.015 (51.18)	.584 (14.83)	1.10 (27.94)	1.996 (51)	2.990 (75.94)
(254)	15.0 (380)	20.0 (508)	5.0 (127)	10.0 (254)	20.0 (508)	30.0 (762)
.595)	.695 (1.034)	.92 (1.369)	.182 (.271)	.530 (.788)	.864 (1.286)	1.423 (2.118)

1/2"	1/2"	7/8"	1 1/4"	1 5/8"
LC12-50J/811034-101 LC12JFR/811034-103 2-50JFRT/811034-107	RT3-FLC12-50J/811035-101 RT3-FLC12-50JFR/811035-103 RT3-FLC12-50JFRT/811035-107	R-FLC78-50J/811036-001 R-FLC78-50JFR/811036-003 R-FLC78-50JFRT/811036-007	R-FLC114-50J/811037-001 R-FLC114-50JFR/811037-003 R-FL 0C114-50JFRT/811037-007	R-FLC158-50J/811038-001 R-FLC158-50JFR/811038-003 R-FLC158-50JFRT/811038-007
50	50	50	50	50
88	88	88	88	88
4000	4000	8000	8700	15,000
0.36 (1.18)	0.43 (1.41)	0.21 (0.69)	0.17 (0.56)	0.15 (0.49)
0.40 (1.31)	0.47 (1.54)	0.21 (0.69)	0.16 (0.53)	0.15 (0.49)
60	51	65	68	63
5.14	5.14	10.7	17.2	21.7
1.3	1.3	1.3	1.3	1.3
1.1 (3.61)	1.5 (4.92)	0.54 (1.77)	0.39 (1.28)	0.33 (1.08)
1.1 (3.61)	1.7 (5.58)	0.54 (1.77)	0.37 (1.2)	0.33 (1.08)
52	46	58	59	61
2.24	2.24	4.6	7.2	9.2
1.3	1.3	1.3	1.3	1.3
2.8 (9.18)	6.5 (21.3)	1.1 (3.61)	0.80 (2.62)	0.61 (2.0)
2.5 (8.20)	4.1 (13.5)	1.1 (3.61)	0.73 (2.4)	0.61 (2.0)
57	50	63	66	68
1.25	1.25	2.5	3.9	4.9
1.3	1.3	1.3	1.3	1.3
5.0 (16.4)	13.0 (42.7)	1.9 (6.23)	1.4 (4.6)	1.0 (3.28)
3.6 (11.8)	5.5 (18.1)	1.6 (5.3)	1.2 (3.9)	1.0 (3.28)
63	62	69	71	72
0.86	0.86	1.7	2.6	3.3
1.3	1.3	1.3	1.3	1.3
9.2 (30.2)	23.0 (75.5)	3.1 (10.2)	2.3 (7.6)	1.7 (5.58)
4.9 (16.1)	6.8 (22.3)	2.3 (7.5)	1.7 (5.6)	1.4 (4.7)
69	66	72	73	77
0.60	0.60	1.1	1.7	1.2
1.3	1.3	1.3	1.3	1.3
0.65 (16)	0.65 (16)	1.11 (28)	1.58 (40)	2.02 (51)
0.65 (16)	0.65 (16)	1.11 (28)	1.58 (40)	2.02 (51)
0.73 (19)	0.73 (19)	1.15 (29)	1.60 (41)	2.02 (51)
.547 (13.9)	.547 (13.9)	0.991 (25.1)	1.41 (35.8)	1.83 (46.5)
5.0 (125)	5.0 (125)	10.0 (250)	15.0 (380)	20.0 (508)
0.16 (0.23)	0.16 (0.23)	0.35 (0.52)	0.64 (0.95)	0.91 (1.35)
0.18 (0.26)	0.18 (0.26)	0.39 (0.59)	0.74 (1.11)	1.07 (1.59)
0.22 (0.33)	0.22 (0.33)	0.41 (0.61)	0.71 (1.06)	1.01 (1.58)
300 (1334)	300 (1334)	330 (1468)	400 (1780)	400 (1780)

Cable Type	Size in.	Connector Type	Ordering #	Outer Dia.	Length in (mm)	Weight lbs (kg)
Flexwell® LL Flex™ Foam	1/4"	N-Male	734769	.5 (12.7)	1.36 (34.55)	.2 (.09)
		N-Female	734770	.62 (15.75)	1.39 (35.31)	.2 (.09)
	1/2"	N-Male	734701	.87 (22.1)	2.2 (55.9)	.276 (.125
		N-Female	734710	.87 (22.1)	2.2 (55.9)	.276 (.125
Flexwell® Foam	1/2"	N-Male	738802	1.0 (25)	3.3 (84)	0.4 (0.2)
		N-Female	738801	1.0 (25)	3.1 (79)	0.4 (0.2)
		UHF Male	738804	1.0 (25)	3.0 (76)	0.4 (0.2)
		UHF Female	738803	1.0 (25)	3.0 (76)	0.4 (0.2)
		7/8" EIA	738807	1.0 (25)	3.4 (86)	0.8 (0.4)
		Splice	738806	1.0 (25)	3.6 (91)	0.6 (0.3)
	7/8"	N-Male	738841	1.5 (3.8)	3.0 (76)	0.8 (0.4)
		N-Female	738842	1.5 (3.8)	3.0 (76)	0.8 (0.4)
		UHF Male	738843	1.5 (3.8)	3.0 (76)	0.8 (0.4)
		UHF Female	738844	1.5 (3.8)	3.0 (76)	0.8 (0.4)
		7/8" EIA	738845	1.5 (3.8)	2.9 (73)	1.41 (0.6)
		End Terminal	738847	1.5 (3.8)	4.1 (104)	1.1 (0.5)
		Splice	738846	1.5 (3.8)	4.1 (104)	1.5 (0.6)
		N-Male(GP)	738882/738888	2.0 (50.8)	3.9 (99)	1.4 (0.6)
		N-Female(GP)	738883/738889	2.0 (50.8)	4.0 (101.6)	1.4 (0.6)
	1 1/4"	7/8" EIA(GP)	738880	2.0 (50.8)	3.3 (83.8)	1.8 (0.8)
		1 5/8" EIA(GP)	738881	2.0 (50.8)	3.8 (96.5)	2.8 (1.3)
		Splice(GP)	738885	2.0 (50.8)	6.1 (154.9)	2.5 (1.1)
		N-Male	738850	2.5 (63)	5.0 (127)	3.0 (1.3)
		N-Female	738851	2.5 (63)	5.2 (130)	3.0 (1.3)
	1 5/8"	7/8" EIA(GP)	738854	2.5 (63)	4.0 (101)	3.2 (1.4)
		1 5/8" EIA(GP)	738853	2.5 (63)	4.4 (113)	4.0 (1.8)
		Splice	738855	2.5 (63)	4.7 (119)	4.5 (2.0)
Flexwell® Air	1/2"	N-Male	738200	1.0 (25)	3.2 (82)	0.5 (0.2)
		N-Female	738201	1.0 (25)	3.2 (82)	0.5 (0.2)
		Splice	738204	1.0 (25)	3.4 (87)	0.6 (0.3)
	7/8"	N-Male	738225	1.4 (36)	3.9 (100)	0.8 (0.4)
		N-Female	738226	1.4 (36)	3.9 (100)	0.8 (0.4)
		7/8" EIA(GP)	738230	1.4 (36)	4.2 (106)	1.5 (0.7)
		7/8" EIA(GB)	738229	1.4 (36)	4.2 (106)	1.5 (0.7)
		Splice	738231	1.4 (36)	4.7 (119)	1.2 (0.5)
		End Terminal	738232	1.4 (36)	4.9 (124)	0.9 (0.4)
	1 5/8"	N-Female	738301	2.5 (63)	5.2 (131)	3.2 (1.5)
		1 5/8" EIA(GP)	738314	2.5 (63)	4.4 (113)	4.0 (1.8)
		1 5/8" EIA(GB)	738303	2.5 (63)	4.4 (113)	4.0 (1.8)
		7/8" EIA(GB)	738304	2.5 (63)	4.0 (101)	4.2 (1.9)
		7/8" EIA(GP)	738311	2.5 (63)	4.0 (101)	4.2 (1.9)
		End Terminal	738306	2.5 (63)	7.4 (187)	4.6 (2.1)
		Splice	738305	2.5 (63)	4.7 (119)	5.8 (2.6)
	3"	3 1/8" EIA(GP)	738355	5.2 (131)	7.9 (200)	11.0 (5.0)
		3 1/8" EIA (GB)	738350	5.2 (131)	7.9 (200)	11.0 (5.0)
		Splice	738352	3.5 (89)	7.4 (187)	11.0 (5.0)
Flexwell® Radiating	1/4"	N-Male	734769	.5 (12.7)	1.36 (34.55)	.2 (.09)
		N-Female	734770	.62 (15.75)	1.39 (35.31)	.2 (.09)
	3/8"	N-Male	734761	0.8 (20)	1.7 (43)	0.3 (0.1)
		N-Female	734762	0.8 (20)	1.8 (45)	0.3 (0.1)
		UHF Male	734773	0.8 (20)	1.7 (43)	0.3 (0.1)
		UHF Female	734774	0.8 (20)	1.8 (45)	0.3 (0.1)
		Splice	734777	0.8 (20)	1.7 (43)	0.4 (0.2)
	1/2"	N-Male	738802	1.0 (25)	3.3 (84)	0.4 (0.2)
		N-Female	738801	1.0 (25)	3.1 (79)	0.4 (0.2)
		UHF Male	738804	1.0 (25)	3.0 (76)	0.4 (0.2)
		UHF Female	738803	1.0 (25)	3.0 (76)	0.4 (0.2)
		Splice	738806	1.0 (25)	3.6 (91)	0.6 (0.3)
	7/8"	N-Male	738841	1.5 (3.8)	3.0 (76)	0.8 (0.4)
		N-Female	738842	1.5 (3.8)	3.0 (76)	0.8 (0.4)
		UHF Male	738843	1.5 (3.8)	3.0 (76)	0.8 (0.4)
		UHF Female	738844	1.5 (3.8)	3.0 (76)	0.8 (0.4)
		Splice	738846	1.5 (3.8)	4.1 (104)	1.5 (0.6)
	1 1/4"	N-Male	738882	2.0 (50.8)	3.9 (99)	1.4 (0.6)
		N-Female	738883	2.0 (50.8)	4.0 (101.6)	1.4 (0.6)
		Splice	738885	2.0 (50.8)	6.1 (154.9)	2.5 (1.1)
	1 5/8"	N-Male	738850	2.5 (63)	5.0 (127)	3.0 (1.3)
		N-Female	738851	2.5 (63)	5.2 (130)	3.0 (1.3)
		Splice	738855	2.5 (63)	4.7 (119)	4.5 (2.0)

* All connectors are available with silver-plated bodies and hold center pins. Contact Celwave sales engineering.
* Din Connector specifications are located on page 155.

Name	Size in.	Length ft (m)	Package	Shipping Size in. (mm)	Shipping Volume cu. ft. (cu. m)	Tare Weight lbs (kg)
Flexwell® LL Flex™ Foam	1/4"	0-250 (0-76)	Carton	29 x 29 x 9 (737 x 737 x 229)	1.8 (0.05)	4 (2)
		0-750 (0-228)	Non-returnable reel	33 dia. x 20 wide (833 x 508)	12.6 (0.35)	106 (48.1)
		750-2150 (228-655)	Non-returnable reel	43 dia. x 23 wide (1092 x 584)	24.6 (0.69)	211 (95.7)
		2150-9050 (655-2758)	Non-returnable reel	51 dia. x 36 wide (1296 x 914)	54.2 (1.53)	342 (155)
	1/2"	0-100 (0-30)	Carton	29 x 29 x 9 (737 x 229)	4.4 (0.12)	6 (2.7)
		100-300 (30-91)	Carton	63 x 63 x 13 (1600 x 1600 x 330)	29.9 (0.8)	48 (22)
		0-500 (0-152)	Non-returnable reel	33 dia. x 20 wide (833 x 508)	12.6 (0.35)	106 (48.1)
		500-1050 (152-320)	Non-returnable reel	43 dia. x 23 wide (1092 x 584)	24.6 (0.69)	211 (95.7)
		1050-5000 (320-1524)	Non-returnable reel	51 dia. x 36 wide (1296 x 914)	54.2 (1.53)	342 (155)
Flexwell® Foam		0-300 (0-91)	Carton	29 x 29 x 9 (737 x 737 x 229)	1.8 (0.05)	6 (2.7)
	1/2"	0-500 (0-152)	Non-returnable reel	33 dia. x 20 wide (833 x 508)	12.6 (0.35)	106 (48.1)
		500-1050 (152-320)	Non-returnable reel	43 dia. x 23 wide (1092 x 584)	24.6 (0.69)	211 (96)
		1050-5000 (320-1524)	Non-returnable reel	51 dia. x 36 wide (1295 x 914)	54.2 (1.53)	342 (155)
		0-300 (0-91)	Carton	63 x 63 x 13 (1600 x 1600 x 330)	25.0 (0.71)	48 (22)
		300-1000 (91-305)	Non-returnable reel	75 dia. x 23 wide (1905 x 584)	74.8 (2..12)	402 (122)
	7/8"	1000-1400 (305-347)	Non-returnable reel	78 dia. x 25 wide (1981 x 635)	88.0 (2.49)	578 (176)
		1400-2150 (347-655)	Non-returnable reel	63 dia. x 31 wide (1600 x 787)	71.2 (2.01)	484 (147)
		2150-4350 (655-1326)	Non-returnable reel	75 dia. x 44 wide (1905 x 1117)	143.2 (4.05)	716 (218)
		0-75 (0-23)	Carton	63 x 63 x 13 (1600 x 1600 x 330)	29.9 (0.8)	48 (22)
		75-500 (23-152)	Non-returnable reel	75 dia. x 23 wide (1905 x 584)	74.8 (2.12)	402 (122)
	1 1/4"	500-700 (152-213)	Non-returnable reel	78 dia. x 25 wide (1981 x 635)	88.0 (2.5)	578 (262)
		700-1200 (213-366)	Non-returnable reel	83 dia. x 35 wide (2108 x 889)	139.5 (3.95)	754 (342)
		1200-2000 (366-610)	Non-returnable reel	83 dia. x 41 wide (2108 x 1041)	163.4 (4.62)	848 (384)
		2000-3500 (610-1067)	Non-returnable reel	91 dia. x 23 wide (2311 x 584)	196.4 (5.56)	949 (430)
		0-50 (0-15)	Carton	63 x 63 x 13 (1600 x 1600 x 330)	29.9 (0.8)	48 (22)
		75-230 (23-70)	Non-returnable reel	75 dia. x 23 wide (1905 x 584)	74.8 (2.12)	402 (122)
		230-400 (70-122)	Non-returnable reel	78 dia. x 25 wide (1981 x 635)	88.0 (2.5)	578 (262)
	1 5/8"	400-680 (122-207)	Non-returnable reel	83 dia. x 35 wide (2108 x 889)	139.5 (3.95)	754 (342)
		680-800 (207-244)	Non-returnable reel	83 dia. x 41 wide (2108 x 1041)	163.4 (4.62)	848 (384)
		800-1400 (244-427)	Non-returnable reel	91 dia. x 23 wide (2311 x 584)	196.4 (5.56)	949 (430)
		1400-2950 (427-899)	Non-returnable reel	101 dia. x 59 wide (2565 x 1499)	348.3 (9.86)	1718 (779)
		2950-3500 (899-1067)	Non-returnable reel	111 dia. x 60 wide (2819 x 1524)	427.8 (11.70)	2224 (1009)
		0-300 (0-91)	Carton	29 x 29 x 9 (737 x 737 x 229)	4.4 (.12)	6 (2.7)
	1/2"	0-500 (0-152)	Non-returnable reel	33 dia. x 20 wide (833 x 508)	12.6 (0.35)	106 (48)
		500-1050 (152-320)	Non-returnable reel	43 dia. x 23 wide (1092 x 584)	24.6 (0.69)	211 (96)
		1050-5000 (320-1524)	Non-returnable reel	51 dia. x 36 wide (1295 x 914)	54.2 (1.53)	342 (155)
		0-100 (0-30)	Carton	29 x 29 x 9 (737 x 737 x 229)	4.4 (.12)	6 (2.7)
		100-300 (30-91)	Carton	63 x 63 x 13 (1600 x 1600 x 330)	29.9 (0.8)	48 (22)
	7/8"	0-1000 (0-305)	Non-returnable reel	75 dia. x 23 wide (1905 x 584)	74.8 (2.12)	402 (182)
		1000-1400 (305-427)	Non-returnable reel	78 dia. x 25 wide (1981 x 635)	88.0 (2.49)	578 (262)
		1400-2150 (427-655)	Non-returnable reel	63 dia. x 31 wide (1600 x 1168)	71.2 (2.99)	484 (219)
		2150-3300 (655-1006)	Non-returnable reel	75 dia. x 44 wide (1905 x 1117)	143.2 (4.05)	716 (324)
		0-50 (0-15)	Carton	63 x 63 x 13 (1600 x 1600 x 330)	25.0 (0.7)	40 (18)
		0-270 (0-82)	Non-returnable reel	75 dia. x 23 wide (1905 x 584)	74.8 (2.12)	402 (182)
		270-400 (82-122)	Non-returnable reel	78 dia. x 25 wide (1981 x 635)	88.0 (2.49)	578 (262)
Flexwell® Air	1 5/8"	400-800 (122-144)	Non-returnable reel	83 dia. x 35 wide (2108 x 889)	139.5 (3.95)	754 (342)
		800-1100 (244-335)	Non-returnable reel	83 dia. x 41 wide (2108 x 1041)	163.4 (4.62)	848 (384)
		1100-1800 (335-549)	Non-returnable reel	91 dia. x 41 wide (2311 x 1041)	196.4 (5.56)	949 (430)
		1800-3000 (549-914)	Returnable reel	101 dia. x 59 wide (2565 x 1499)	383.6 (10.86)	1718 (779)
		3000-4000 (914-1220)	Returnable reel	111 dia. x 60 wide (2819 x 1524)	427.8 (11.70)	2224 (1009)
		0-350 (0-107)	Non-returnable reel	83 dia. x 35 wide (2108 x 889)	139.5 (3.95)	754 (342)
		350-400 (107-122)	Non-returnable reel	83 dia. x 41 wide (2108 x 1041)	163.4 (4.62)	848 (384)
	3"	400-700 (122-213)	Non-returnable reel	91 dia. x 41 wide (2311 x 1041)	196.4 (5.56)	949 (430)
		700-1400 (213-427)	Returnable reel	101 dia. x 59 wide (2565 x 1499)	383.6 (10.86)	1718 (779)
		1400-2250 (427-686)	Returnable reel	111 dia. x 60 wide (2819 x 1524)	427.8 (11.70)	2224 (1009)
		0-250 (0-76)	Carton	29 x 29 x 9 (737 x 737 x 229)	1.8 (0.05)	4 (2)
	1/4"	0-750 (0-228)	Non-returnable reel	33 dia. x 20 wide (833 x 508)	12.6 (0.35)	106 (48.1)
		750-2150 (228-655)	Non-returnable reel	43 dia. x 23 wide (1092 x 584)	24.6 (0.69)	211 (95.7)
		2150-9050 (655-2758)	Non-returnable reel	51 dia. x 36 wide (1296 x 914)	54.2 (1.53)	342 (155)
		0-250 (0-76)	Carton	29 x 29 x 9 (737 x 737 x 229)	1.8 (0.05)	6 (2.7)
	3/8"	0-750 (0-228)	Non-returnable reel	33 dia. x 20 wide (833 x 508)	12.6 (0.35)	106 (48.1)
		750-2150 (228-655)	Non-returnable reel	43 dia. x 23 wide (1092 x 584)	24.6 (0.69)	211 (95.7)
		2150-9050 (655-2758)	Non-returnable reel	51 dia. x 36 wide (1296 x 914)	54.2 (1.53)	342 (155)
		0-300 (0-91)	Carton	29 x 29 x 9 (737 x 737 x 229)	1.8 (0.05)	6 (2.7)
	1/2"	0-500 (0-152)	Non-returnable reel	33 dia. x 20 wide (833 x 508)	12.6 (0.35)	106 (48.1)
		500-1050 (152-320)	Non-returnable reel	43 dia. x 23 wide (1092 x 584)	24.6 (0.69)	211 (96)
		1050-5000 (320-1524)	Non-returnable reel	51 dia. x 36 wide (1295 x 914)	54.2 (1.53)	342 (155)
Flexwell® Radiating		0-300 (0-91)	Carton	63 x 63 x 13 (1600 x 1600 x 330)	25.0 (0.71)	48 (22)
		300-1000 (91-305)	Non-returnable reel	75 dia. x 23 wide (1905 x 584)	74.8 (2.12)	402 (122)
	7/8"	1000-1400 (305-347)	Non-returnable reel	78 dia. x 25 wide (1981 x 635)	88.0 (2.49)	578 (262)
		1400-2150 (347-655)	Non-returnable reel	63 dia. x 31 wide (1600 x 787)	71.2 (2.01)	484 (147)
		2150-4350 (655-1326)	Non-returnable reel	75 dia. x 44 wide (1905 x 1117)	143.2 (4.05)	716 (218)
		0-75 (0-23)	Carton	63 x 63 x 13 (1600 x 1600 x 330)	29.9 (0.8)	40 (18)
		75-500 (23-152)	Non-returnable reel	75 dia. x 23 wide (1905 x 584)	74.8 (2.12)	402 (122)
	1 1/4"	500-700 (152-213)	Non-returnable reel	78 dia. x 25 wide (1981 x 635)	88.0 (2.5)	578 (262)
		700-1200 (213-366)	Non-returnable reel	83 dia. x 35 wide (2108 x 889)	139.5 (3.95)	754 (342)
		1200-2000 (366-610)	Non-returnable reel	83 dia. x 41 wide (2108 x 1041)	163.4 (4.62)	848 (384)
		2000-5000 (610-1524)	Non-returnable reel	91 dia. x 23 wide (2311 x 584)	196.4 (5.56)	949 (430)
		0-50 (0-15)	Carton	63 x 63 x 13 (1600 x 1600 x 330)	29.9 (0.8)	48 (22)
		75-230 (23-70)	Non-returnable reel	75 dia. x 23 wide (1905 x 584)	74.8 (2.12)	402 (122)
		230-400 (70-122)	Non-returnable reel	78 dia. x 25 wide (1981 x 635)	88.0 (2.5)	578 (262)
	1 5/8"	400-680 (122-207)	Non-returnable reel	83 dia. x 35 wide (2108 x 889)	139.5 (3.95)	754 (342)
		680-800 (207-244)	Non-returnable reel	83 dia. x 41 wide (2108 x 1041)	163.4 (4.62)	848 (384)
		800-1400 (244-427)	Non-returnable reel	91 dia. x 23 wide (2311 x 584)	196.4 (5.56)	949 (430)
		1400-2950 (427-899)	Non-returnable reel	101 dia. x 59 wide (2565 x 1499)	348.3 (9.86)	1718 (779)
		2950-5000 (899-1524)	Non-returnable reel	111 dia. x 60 wide (2819 x 1524)	427.8 (11.70)	1906 (864)



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The Great Seal™ is the best environmental protection you can buy for cable connections. It shouldn't come as a surprise that you heard about it here first. As a Division of RFS, Inc., Celwave has been synonymous with innovations in transmission line products for years.

We introduced sequential cable markings, designed the self-flaring, double O-ring connector and perfected dielectric foam. Now we've found a better way to put them all together.

Simply slip the Great Seal™ over a cable connection, pull out its plastic support coil and it instantly squeezes into a tight, form fitting sleeve that stops water migration cold. No heat shrinking, no taping, no blisters, no air pockets, no cutting, and it only takes about 3 minutes per connection. That can save you 45 minutes an hour hook-up time on every installation.

Celwave has become the quality source for mobile telecommunications products worldwide. Our RF transmission line is available in air dielectric, foam and radiating styles from 1/4" to 3" in diameter. With innovative products like The Great Seal™ we insure your system's integrity from top to bottom and everywhere in between.

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Cavities, Filters and Duplexers

Cavities, Filters and Duplexers

THE FOLLOWING INFORMATION IS REQUIRED WHEN PLACING AN ORDER:

BANDPASS CAVITY...
- Frequency (specified by item group)
- Insertion loss

PASS-REJECT CAVITY...
- Pass frequency
- Reject frequency
- Check Tx/Rx spacing (per catalog specified minimum spacing)

NOTCH CAVITY...
- Provide reject frequency

BANDPASS FILTER...
- Provide bandwidth
- Beginning & End frequencies

DUPLEXER...
- Transmit frequency
- Receive frequency
- Check Tx/Rx spacing (per catalog specified minimum spacing)

TO PLACE AN ORDER:

IN NORTH AMERICA, MEXICO:

Tel: 1-800/321-4700 Fax: 1-615/641-1910

INTERNATIONAL:

Tel: 1-908/462-1880 Fax: 1-908/431-8388

TECHNICAL SUPPORT:

Tel: 800/659-1880 Fax: 1-908/462-6919

OR CALL....1-800/CELWAVE

Band Pass Cavities

PD644*	30-39 MHz
PD645*	39-50 MHz
PD1185*	66-88 MHz
PD1186*	136-174 MHz
PD1187*	406-512 MHz

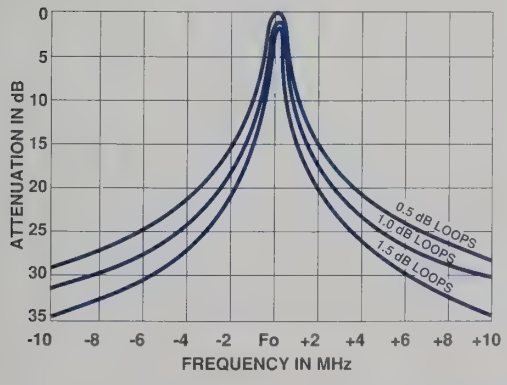
***Exact frequency and insertion loss must be specified.**

The PD644 and PD645 are low band 12-inch diameter cavity resonators for high selectivity applications. Capacity tuned, these TEM mode units employ capacitive probe coupling for easy field adjustment of insertion loss. Differential expansion of inner and outer conductor materials is utilized to temperature compensate the units from $^{-}40°$ to $^{+}160°$F.

The PD1185, PD1186 and PD1187 are also designed for high selectivity applications. They are 12-inch diameter cavity, standard coaxial resonators with the PD1185 and PD1186 operating as quarter wave devices and PD1187 operating as a three quarter wave device. Adjustable loops are standard to provide adjustment of isolation and insertion loss. The cavities are temperature compensated and are available as single units or in multiple cavity assemblies of two or more.

- **High selectivity** — Provides optimum attenuation of adjacent channels or interfering RF.
- **Temperature compensated** — Assures frequency stability across operating temperature range.

PD1187 RESPONSE CURVE (Typical)
(406-512 MHz)



PD644
PD645

PD1185

PD1186
PD1187

CAVITY

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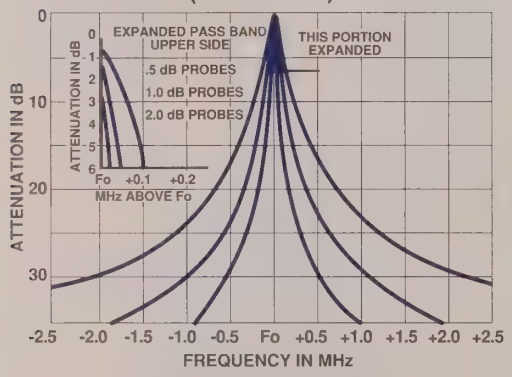
Band Pass Cavities

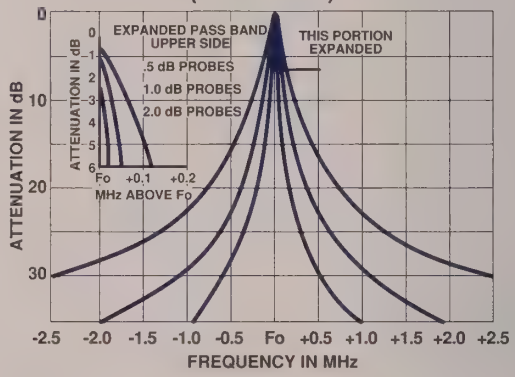
ELECTRICAL SPECIFICATIONS	PD644	PD645	PD1185	PD1186	PD1187
Frequency Range - MHz	30-39	39-50	66-88	136-174	406-512
Continuous Power Input - Watts					
0.5 dB Insertion Loss	350	350	350	500	500
1.0 dB Insertion Loss	125	125	180	350	350
1.5 dB Insertion Loss	—	—	120	175	175
2.0 dB Insertion Loss	50	50	—	—	—
Insertion Loss - dB	0.5 to 2.0	0.5 to 2.0	0.5 to 1.5	0.5 to 1.5	0.5 to 1.5
Maximum VSWR	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1
Impedence - Ohms	50	50	50	50	50
Connector Type	N-female	N-female	N-female	N-female	N-female
Temperature Range - °F (°C)			$^{-}22$ to $^{+}140$ ($^{-}30$ to $^{+}60$)		

MECHANICAL SPECIFICATIONS	PD644	PD645	PD1185	PD1186	PD1187
Outer Conductor Material	5052 Aluminum	5052 Aluminum	5052 Aluminum	5052 Aluminum	5052 Aluminum
Inner Conductor Material	Copper	Copper	Copper	Copper	Copper
Cavity Diameter - in. (mm)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)
Maximum Lengths - in. (mm)	89.5 (2273)	72 (1929)	62 (1575)	36 (914)	36 (914)
Weight - lbs. (kg)	40 (18)	36 (16.3)	32 (14.5)	22 (10)	22 (10)

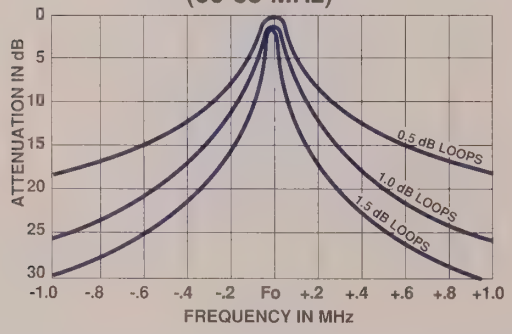
PD644 RESPONSE CURVE (Typical)
(30-39 MHz)



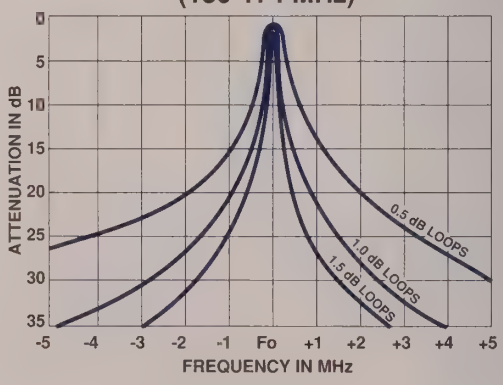
PD645 RESPONSE CURVE (Typical)
(39-50 MHz)



PD1185 RESPONSE CURVE (Typical)
(66-88 MHz)



PD1186 RESPONSE CURVE (Typical)
(136-174 MHz)



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High-Q Band Pass Cavities

PD5013-B*	148-174 MHz
PD5013-E*	275-300 MHz
PD5013-A*	440-512 MHz

***Exact frequency and insertion loss must be specified.**

The high selectivity of these all copper, eight inch cavities excel, in applications with narrow frequency separation requiring greater selectivity than achievable with a six inch diameter cavity. The PD5013 is available in single or cascaded (multiple) cavity assemblies of two, three or more.

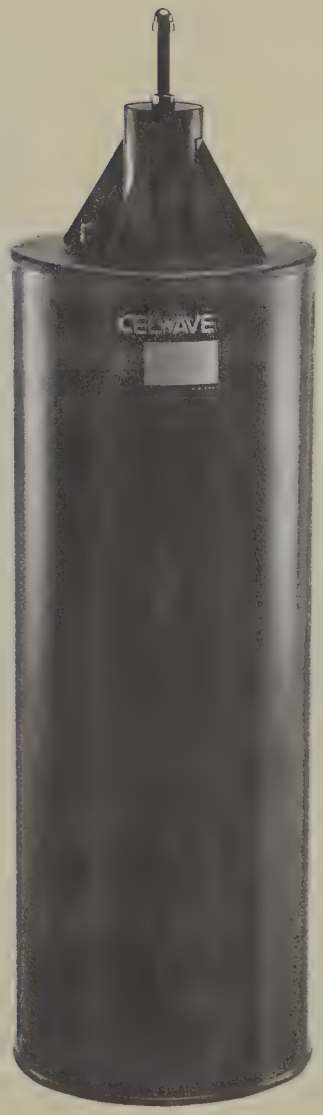
Double temperature compensation of these cavities provides frequency stability from $^{-}40°$ to $^{+}160°$F. All cavities are supplied with adjustable loops for qualified field adjustment.

The PD5013E is a quarter-wave resonator which is designed to cover the 275-300 MHz portion of the spectrum. Nominal insertion loss is 1.5 dB but other insertion loss values can be supplied on request. At 1.5 dB insertion loss the operating Q-value is 1420.

Contact our Customer Service Department for more information on cascading and mounting.

- **High selectivity** — Provides maximum attenuation of adjacent channels.
- **Temperature compensated** — Frequency stability across operating temperature range.

WHEN ORDERING:
Provide frequency (specified by item group) and insertion loss.



PD5013

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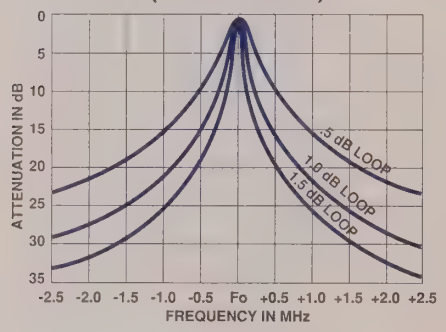
High-Q Band Pass Cavities

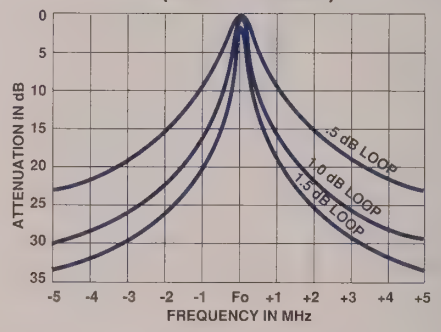
ELECTRICAL SPECIFICATIONS	PD5013-B	PD5013-E	PD5013-A
Frequency Range - MHz	148-174	275-300	440-512
Continuous Power Input - Watts			
0.5 dB Insertion Loss	350	—	350
1.0 dB Insertion Loss	200	—	200
1.5 dB Insertion Loss	125	125	125
Insertion Loss - dB	0.5, 1.0 or 1.5 — Dependent upon power requirements	1.5	0.5, 1.0 or 1.5 — Dependent upon power requirements
VSWR at Resonance - (min.)	1.3:1	1.3:1	1.3:1
Impedance - Ohms	50	50	50
QL with 1.5 dB Loops	1300	1420 (typical)	1900
Connectors	N-female	N-female	N-female
Temperature Range - °F (°C)	-40 to +160 (-40 to +71)	-40 to +160 (-40 to +71)	-40 to +160 (-40 to +71)

MECHANICAL SPECIFICATIONS	PD5013-B	PD5013-E	PD5013-A
Cavity Diameter - in. (mm)	8-5/32 (207)	8 (203)	8-5/32 (207)
Maximum Length - in. (mm)	35 (889)	20 (508)	35 (889)
Weight - lbs. (kg)	10.5 (4.76)	6 (2.7)	10.5 (4.76)

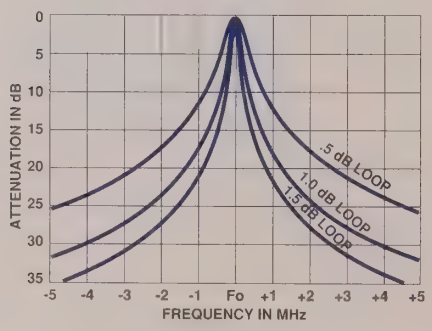
PD5013-B RESPONSE CURVE (Typical)
(148-174 MHz)



PD5013-A RESPONSE CURVE (Typical)
(440-512 MHz)



PD5013-E RESPONSE CURVE (Typical)
(275-300 MHz)



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Band Pass Cavities

PD500* 66-960 MHz
PD5090* 136-174 MHz

***Exact frequencies and insertion loss must be specified; see Ordering Information below.**

The PD500 all copper 6 inch diameter quarter-wave cavity resonator provides the selectivity needed to help alleviate the problems created by spectrum congestion. They are available in single or in multiple cavity assemblies of two, three or more units. Selectivity curves given are for a single cavity in the 66-88, 136-174, 406-512, and the 806-960 MHz bands. The selectivity of a two or three cavity assembly may be estimated by multiplying the attenuation values in dB given on these curves, by the number of cavities used. Temperature compensation of these cavities provides frequency stability over the temperature range -40°F to +160°F. All PD500 cavities are supplied with adjustable loops for qualified field adjustment of insertion loss and selectivity.

PD5090 is a new improved version of the PD500-1 allowing field replacement of the coupling loops to convert from band pass to pass reject style. *Order PD5132 for reject loop assembly only.*

- **High selectivity** — Minimizes interference from adjacent systems.
- **Temperature compensated** — Assures frequency stability.
- **Adjustable loops** — Facilitates field adjustment.
- **Replaceable coupling loops** — Allows easy field conversion from band pass to band reject.

Ordering Information

Item Number	Frequency Range - MHz
PD500-0	66-88*
PD500-0S	88-118*
PD500-1S	118-136*
PD500-2	200-300*
PD500-3	300-406*
PD500-4	406-512*
PD500-8	806-960*
PD5090-1-1	136-150*
PD5090-1-2	150-174*

***Exact frequencies and insertion loss must be specified.**

PD500-0 PD5090 PD500-4 PD500-8

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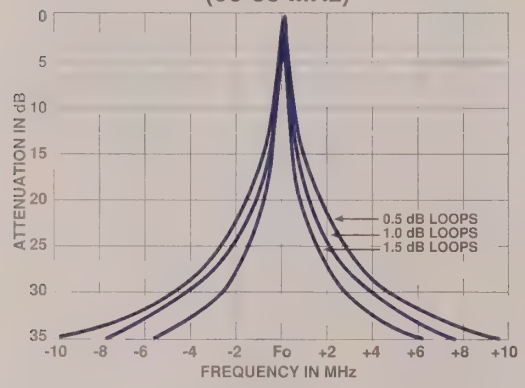
Band Pass Cavities

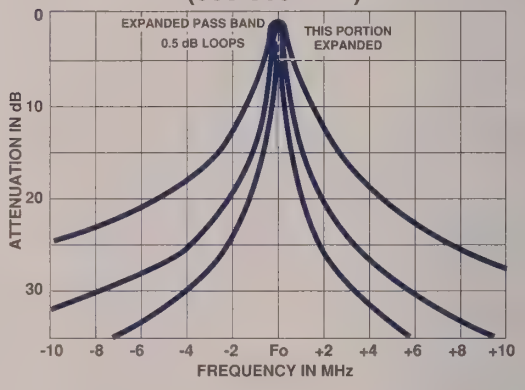
ELECTRICAL SPECIFICATIONS	PD500-0	PD500-0S	PD500-1S	PD5090	PD500-2	PD500-3	PD500-4	PD500-8
Frequency Range - MHz	66-88	88-118	118-136	136-174	200-300	300-406	406-512	806-960
Continuous Power Input - Watts								
0.5 dB Insertion Loss	350	350	350	350	300	300	300	250
1.0 dB Insertion Loss	180	180	180	180	150	150	150	150
1.5 dB Insertion Loss	120	120	120	120	100	100	100	100
Insertion Loss - dB	0.5 dB, 1.0 dB or 1.5 dB, Dependent Upon Power Input Requirements							
Maximum VSWR	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1
Impedance - Ohms	50	50	50	50	50	50	50	50
QL With 1.5 Loops Typical	680	870	920	950	1050	1150	1225	1300
Connector	N-female All Models							
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60) All Models							

MECHANICAL SPECIFICATIONS	PD500-0	PD500-0S	PD500-1S	PD5090	PD500-2	PD500-3	PD500-4	PD500-8
Cavity Diameter - in. (mm)	6 (152.4)	6 (152.4)	6 (152.4)	6 (152.4)	6 (152.4)	6 (152.4)	6 (152.4)	6 (152.4)
Maximum Length - in. (mm)	70 (1778)	63 (1600)	40 (1016)	35 (889)	27 (178)	20.4 (518)	15 (381)	11 (279)
Weight - lbs. (kg)	15 (6.8)	13.5 (6.12)	9.7 (4.41)	8.5 (3.9)	6.56 (2.97)	5.4 (2.45)	4.9 (2.2)	3.8 (1.72)

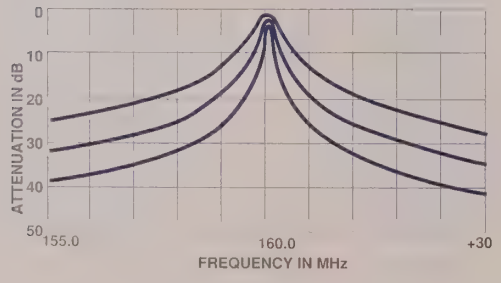
PD500-0 RESPONSE CURVE (Typical)
(66-88 MHz)



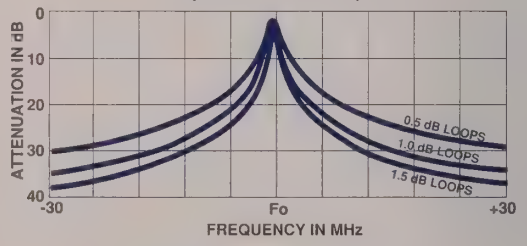
PD500-8 RESPONSE CURVE (Typical)
(806-960 MHz)



PD5090-1-2 RESPONSE CURVE (Typical)
(150-174 MHz)



PD500-4 RESPONSE CURVE (Typical)
(406-512 MHz)



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Pass Reject Cavity

PD505*	66-88, 136-174, 406-512 MHz
PD5091*	136-174 MHz
PD695*	406-512 MHz
PD1155*	406-512 MHz
PD895*	806-960 MHz

***Exact pass and reject frequencies must be specified.**

These Celwave Pass Reject Dual Notch Resonators are designed to pass one frequency and reject another. They provide more attenuation than our band pass type cavities. The response curves provided, detail the sharp slope of the reject side, typical of these cavities. These units can be tuned to reject frequencies either above or below the pass frequency and are temperature compensated to insure stability over an operating range from $^{-}40°$ to $^{+}160°$F.

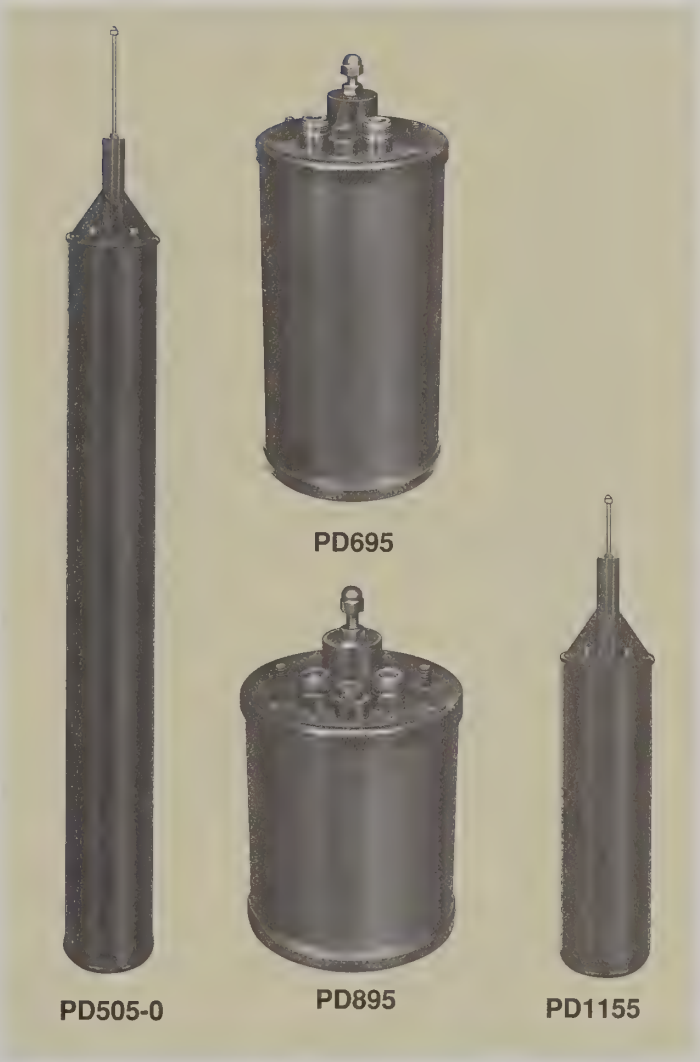
The PD505 cavities are quarter-wave resonators, covering three distinct frequency ranges. PD5091 is a new improved version of the PD505-1 allowing field replacement of the coupling loops to convert from pass reject to band pass style. *Order PD5131 for band pass loop assembly only.*

Like the PD895, the PD695 quarter-wave resonator is only four inches in diameter. It conserves space and expense when power handling requirements do not exceed 250 Watts.

The PD1155 three-quarter wave coaxial resonator provides the highest reject-attenuation in the UHF frequency range. Maximum power handling is rated at 350 Watts.

- **High attenuation** — Minimizes interference from adjacent frequencies.
- **Temperature compensated** — Assures frequency stability.

WHEN ORDERING:
Provide pass/reject frequency and check Tx/Rx spacing (per catalog specified min.).



Ordering Information

Item Number	Frequency Range-MHz	Separation-MHz
PD505-0	66-88*	
PD505-1	136-174*	
PD505-4	406-512*	
PD5091-1-1	136-150*	
PD5091-1-2	150-174*	
PD695-1	406-512*	4-12**
PD695-2	406-512*	2.5-3.5**
PD695-3	406-512*	1-2**
PD1155	406-512*	
PD895	806-960*	

***Exact pass and reject frequencies must be specified.**
****Contact Sales Engineering for separations other than what is listed above.**

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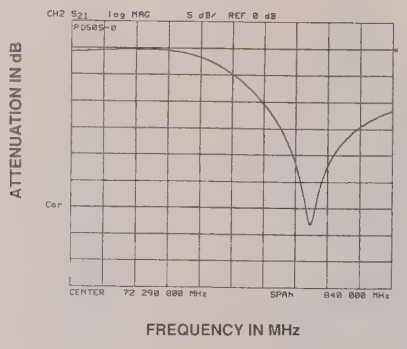
Pass Reject Cavity

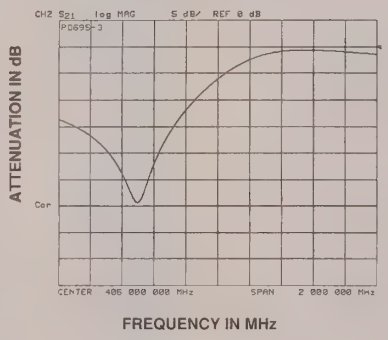
ELECTRICAL SPECIFICATIONS	PD505-0	PD5091	PD505-4	PD695	PD1155	PD895
Frequency Range - MHz	66-88	136-174	406-512	406-512	406-512	806-960
Continuous Power Input - Watts	400	400	400	250	350	100
Insertion Loss - dB	.3	.3 .8	.3 .8	.3 .8	.6 .8	.5
Reject Attenuation - dB	27	27 24	27 24	24 24	30 24	30
Frequency Spacing Min. - MHz	.5	.5 .25	2 1	2 1	1 .5	3.6
Maximum VSWR	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1
Impedance - Ohms	50	50	50	50	50	50
Connector	N-female	N-female	N-female	N-female	N-female	N-female
Temperature °F (°C)			-22 to +140 (-30 to +60)			

MECHANICAL SPECIFICATIONS	PD505-0	PD5091	PD505-4	PD695	PD1155	PD895
Maximum Dimensions Diameter - in. (mm)	6 (152)	6 (152)	6 (152)	4 (101)	6 (152)	4 (101)
Length - in. (mm)	70 (1778)	35 (889)	15 (381)	13 (330)	35 (889)	10 (254)
Weight - lbs. (kg)	15 (6.8)	9 (4.1)	6 (2.7)	4 (1.8)	9 (4.1)	3-1/2 (1.65)

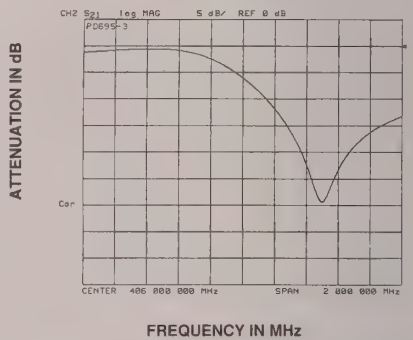
PD505-0 RESPONSE CURVE (Typical)
0.50 MHz SPACING
(66-88 MHz)



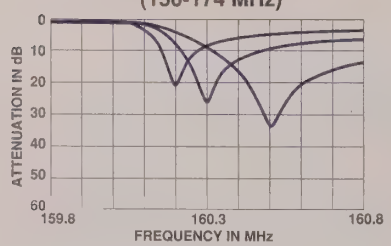
PD695 RESPONSE CURVE (High Pass)
1 MHz SPACING
(406-512 MHz)



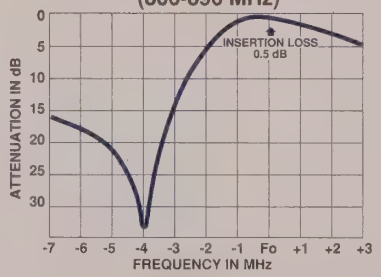
PD695 RESPONSE CURVE (Low Pass)
1 MHz SPACING
(406-512 MHz)



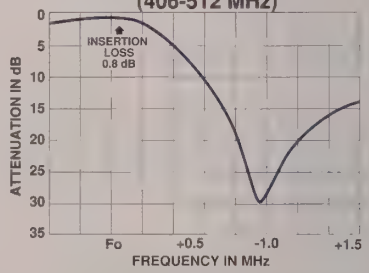
PD5091-1-2 RESPONSE CURVE (Typical)
.25 MHz SPACING
(150-174 MHz)



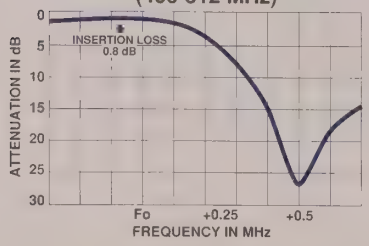
PD895 RESPONSE CURVE (Typical)
3.6 MHz SPACING
(806-896 MHz)



PD505-4 RESPONSE CURVE (Typical)
1 MHz SPACING
(406-512 MHz)



PD1155 RESPONSE CURVE (Typical)
0.5 MHz SPACING
(406-512 MHz)



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Notch Cavities

PD1147* 136-174 MHz
PD1148* 406-512 MHz
PD1153* 406-512 MHz
***Notch frequencies must be specified.**

These filter devices are designed to reject one narrow band of frequencies while passing all others in the operating band. They are especially useful in eliminating adjacent frequency "splash over" or interference from a strong proximity signal. They are available singly or in multiple cavity assemblies of two, three or more units to increase reject attenuation.

Copper construction insures maximum selectivity for these cavities. Each filter is temperature compensated to insure stability from ⁻40° to ⁺160°F.

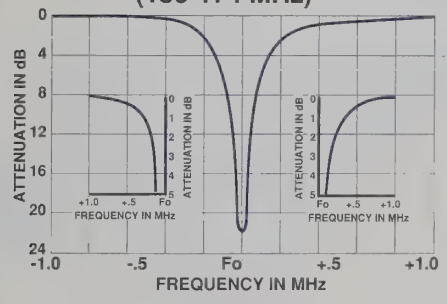
- **Temperature compensated** — Insures frequency stability in operation.
- **Copper construction** — Maximum selectivity.

ELECTRICAL SPECIFICATIONS	PD1147	PD1148	PD1153
Frequency Range - MHz	136-174	406-512	406-512
Continuous Power Input - Watts	400	350	350
Insertion Loss - dB	0.5	0.5	0.5
Reject Attenuation - dB	20	15	17
Frequency Spacing*, Min. - MHz	1.25	2.5	2.0
Maximum VSWR	1.5:1	1.5:1	1.5:1
Impedance - Ohms	50	50	50
Connector Type		N-female	
Temperature Range - °F (°C)		⁻22 to ⁺140 (⁻30 to ⁺60)	

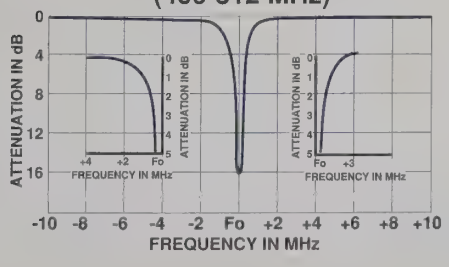
*Units can be supplied for closer spacing on either one side or the other by asymmetric tuning.

MECHANICAL SPECIFICATIONS	PD1147	PD1148	PD1153
Maximum Diameter - in. (mm)	6 (152.4)	6 (152.4)	6 (152.4)
Length - in (mm)	35 (889)	15 (381)	35 (889)
Weight - lbs. (kg)	9.0 (4.1)	6.0 (2.7)	9.0 (4.1)

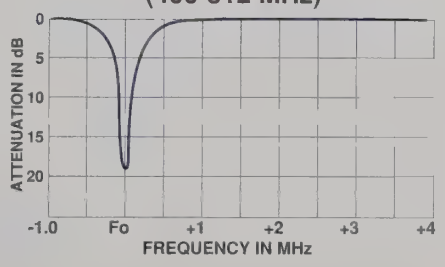
PD1147 RESPONSE CURVES (Typical) (136-174 MHz)



PD1148 RESPONSE CURVES (Typical) (406-512 MHz)



PD1153 RESPONSE CURVE (Typical) (406-512 MHz)



Compact Preselectors

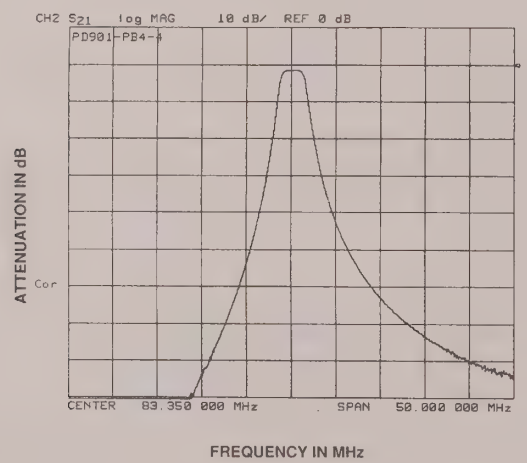
PD901-PB4*	66-88 MHz
PD911-PB4*	144-174 MHz
PD941-PB4*	406-474 MHz
PD951-PB4*	474-512 MHz

***Exact frequencies must be specified.**

These units are designed to provide selectivity in receiver multicoupling systems in high RF density environments. The PD901-PB4 and PB911-PB4 units employ four aperture coupled helical resonators. The PD941-PB4 and PD951-PB4 use coaxial resonators. All preselectors are constructed of extruded aluminum and are temperature compensated to achieve the electrical specifications over the operating temperature range. Multi-window configurations for specialized applications can be constructed. Please consult our Customer Service Department for details.

- **High selectivity** — Minimizes out of band interference.
- **Compact** — Facilitates ease of installation.
- **Temperature compensated** — Assures consistent performance.

PD901-PB4 RESPONSE CURVE (Typical)
(66-88 MHz)



PD901-PB4

PD941-PB4
With Connector Bracket

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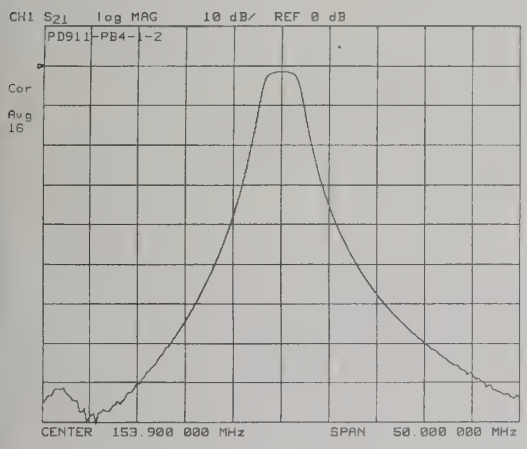
Compact Preselectors

ELECTRICAL SPECIFICATIONS	PD901-PB4	PD911-PB4	PD941-PB4	PD951-PB4
Frequency Range - MHz	66-88	144-174	406-474	474-512
Number of Cavities	4	4	4	4
Insertion Loss - dB	2	1.5 2.25	1 1.5	1 1.5
0.5 dB Bandwidth - MHz Nominal	1.5	4 2	6 3	6 3
Maximum VSWR	1.5:1	1.5:1	1.5:1	1.5:1
Connectors	BNC female	BNC female	BNC female	BNC female
Temperature Range - °F (°C)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		

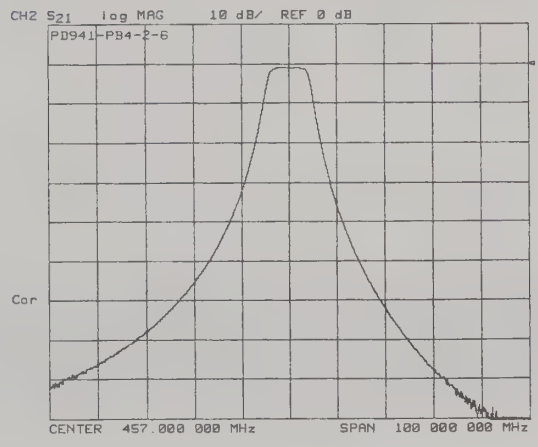
MECHANICAL SPECIFICATIONS	PD901-PB4	PD911-PB4	PD941-PB4	PD951-PB4
Height - in. (mm)	1-1/4 (31.8)	1-1/4 (31.8)	1-1/4 (31.8)	1-1/4 (31.8)
Width - in. (mm)	4-1/8 (105)	4-1/8 (105)	4-1/8 (105)	4-1/8 (105)
Depth - in. (mm) with Connector Bracket for Type N and UHF Connectors	4-11/16 (119) 6-3/4 (171)	4-11/16 (119) 6-3/4 (171)	7-3/16 (183) 9-1/4 (235)	6-15/16 (176) 9 (229)
Weight - lbs. (kg) Standard with Connector Table	1.8 (.8) 2 (.9)	1.8 (.8) 2 (.9)	1.8 (.8) 2 (.9)	1.8 (.8) 2 (.9)

PD911-PB4 -1 RESPONSE CURVE (Typical) (144-174 MHz)



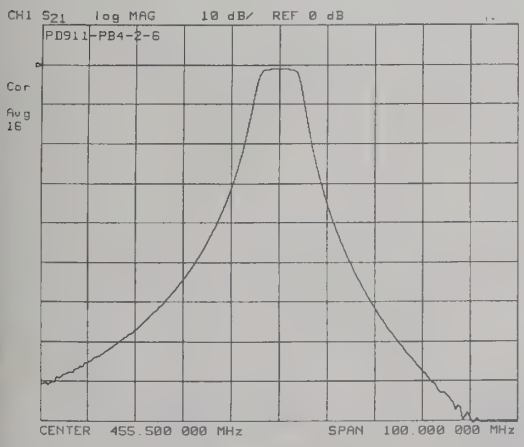
FREQUENCY IN MHz

PD941-PB4-2 RESPONSE CURVE (Typical) (406-474 MHz)



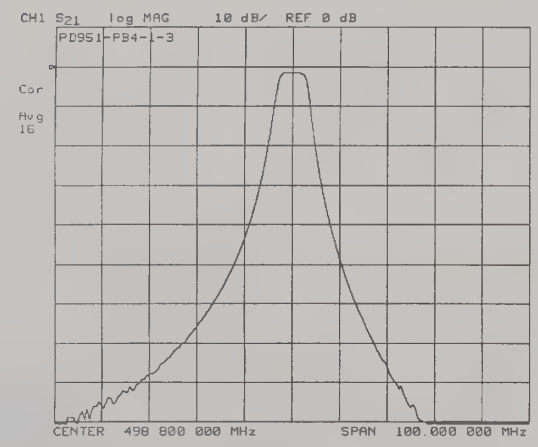
FREQUENCY IN MHz

PD911-PB4 -2 RESPONSE CURVE (Typical) (144-174 MHz)



FREQUENCY IN MHz

PD951-PB4-1 RESPONSE CURVE (Typical) (474-512 MHz)



FREQUENCY IN MHz

Band Pass Filter

PD5044-4* 406-512 MHz
PD5044-8* 806-960 MHz
***Exact frequencies must be specified.**

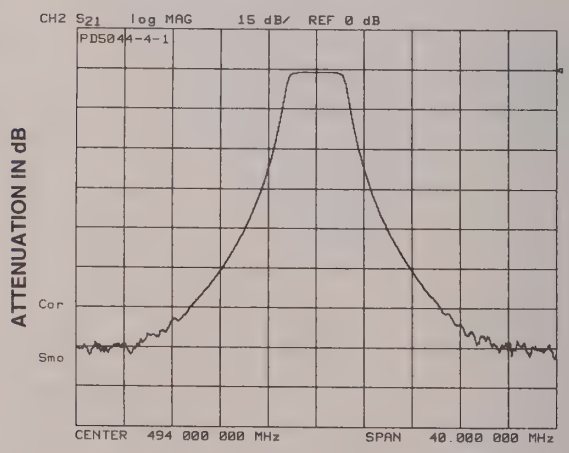
The PD5044-4 and PD5044-8 Band Pass Filters are 6-cavity devices which provide band pass characteristics for both transmitter and receiver applications in the UHF and 800 MHz frequency bands. Constructed of copper for frequency stability, the PD5044-8 is capable of power requirements that average 600 Watts. Both filters employ adjustable aperture coupling between resonators that are permanently fixed at the factory. The PD5044-4 operates over the 406-512 MHz range: PD5044-8 has a frequency range of 806-960 MHz encompassing both United States and European cellular and trunking applications.

- **Temperature compensated** — Ensures consistent performance across operating temperature range.
- **Compact** — Minimizes rack space requirements.
- **High isolation** — Minimizes receiver desense/transmitter noise.

WHEN ORDERING:
Provide bandwidth and frequencies (Beginning and End)

PD5044

PD5044-4 RESPONSE CURVE (Typical)
4 MHz BANDWIDTH
(406-512 MHz)



ATTENUATION IN dB

FREQUENCY IN MHz

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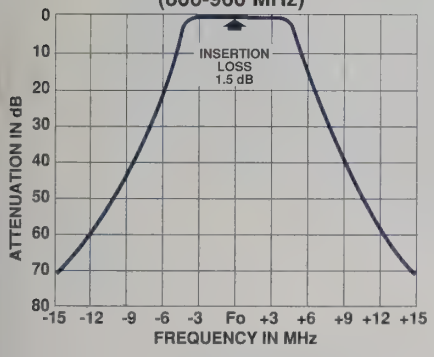
Band Pass Filter

ELECTRICAL SPECIFICATIONS	PD5044-4	PD5044-4	PD5044-8	PD5044-8	PD5044-8	PD5044-8
Frequency Range - MHz	406-512	406-512	806-960	806-960	806-960	806-960
Continuous Power Input - Watts	100	100	600*	400	600*	600*
Bandwidth - MHz	2 (min.)	4	15	5	20	25
Insertion Loss - dB	1.5	1.0	1.0	1.5	0.8	0.8
Maximum VSWR	1.5:1	1.5:1	1.3:1	1.3:1	1.3:1	1.3:1
Impedence - Ohms	50	50	50	50	50	50
Connector Type	N-female	N-female	N-female	N-female	N-female	N-female
Temperature Range - °F (°C)			-22 to +140 (-30 to +60)			

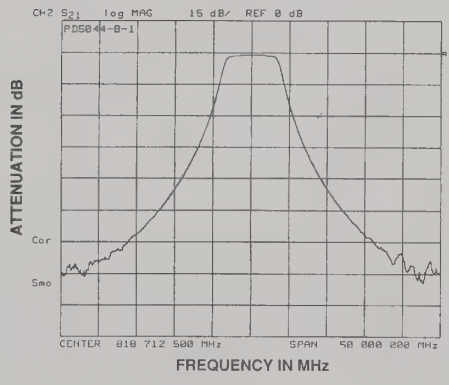
* At 10 MHz or greater bandwidth.

MECHANICAL SPECIFICATIONS	PD5044-4	PD5044-8
Height - in. (mm)	5-1/4 (133)	5-1/4 (133)
Width - in. (mm)	19 (483)	19 (483)
Depth - in. (mm)	12-1/4 (311)	8 (203)
Weight - lbs. (kg)	16 (7.3)	13 (5.9)
Mounts in Standard 19" (483 mm) E.I.A. Rack Panel.		

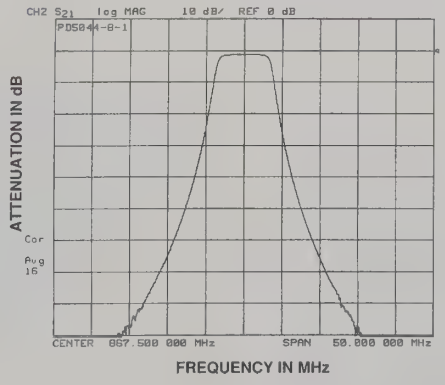
PD5044-8 RESPONSE CURVE (Typical)
15 MHz BANDWIDTH
(806-960 MHz)



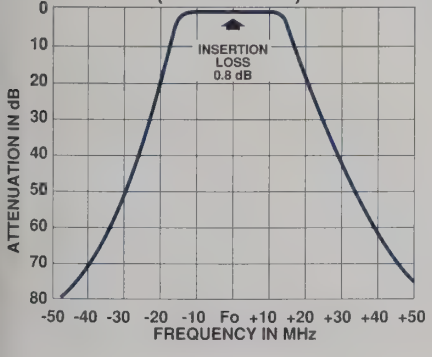
PD5044-8 RESPONSE CURVE (Typical)
15 MHz BANDWIDTH
(806-960 MHz)



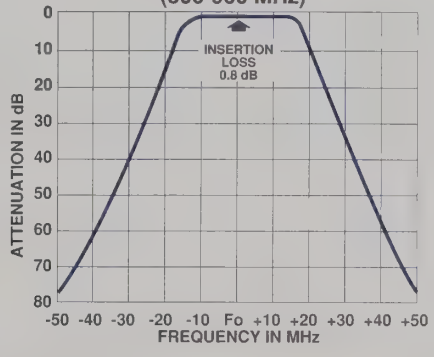
PD5044-8 RESPONSE CURVE (Typical)
10 MHz BANDWIDTH
(806-960 MHz)



PD5044-8 RESPONSE CURVE (Typical)
20 MHz BANDWIDTH
(806-960 MHz)



PD5044-8 RESPONSE CURVE (Typical)
25 MHz BANDWIDTH
(806-960 MHz)



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UHF Receive Filters

PD5102-6-4NF	**450-470 MHz**
PD5102-6-4NFD	**450-470 MHz**
PD5102-6-5/1	**406-445 MHz**
PD5102-6-5/2	**445-475 MHz**
PD5102-6-5/3	**475-512 MHz**

These compact filters are designed for use in receiver multicoupling systems where high RF density environments exists. They feature copper plated construction with superb temperature compensation to maintain rated operation over -22° to +140° F. The PD5102-6-4NF is a six pole combline bandpass filter designed for 4 MHz passband width. Two additional reject poles provide greater than 30 dB attenuation at Fo ±3 MHz. The PD5102-6-4NFD is a dual filter composed of two PD5102-6-4NF bandpass filters. This filter maximizes attenuation between the 4 MHz pass bands of the individuals PD5102-6-4NF filters. Minimum separation between the two pass bands is 11 MHz center to center.

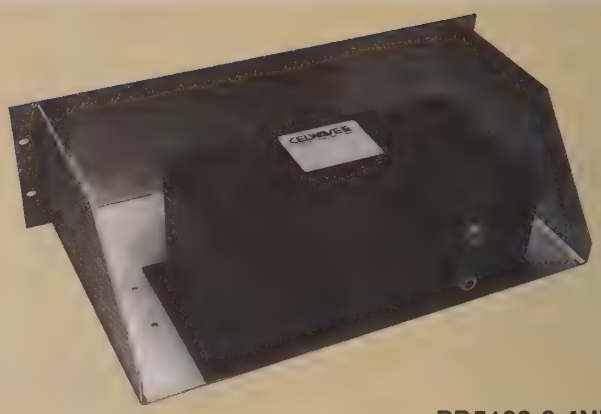
- **Low Loss** — Enhanced performance in high RF density areas.
- **Copper Plating** — Inhibits corrosion, reduces intermodulation susceptibility.

Note: The PD5102-6-4NF* and 4NFD are designed to operate in the UHF trunking band of: 455.5 - 459.5 MHz, 466.0 - 470.0 MHz

*Operates only in one band or the other.

Ordering Information

Item Number	Frequency Range - MHz
PD5102-6-4NF	450-470 MHz
PD5102-6-4NFD	450-470 MHz
PD5102-6-5/1	406-445 MHz
PD5102-6-5/2	445-475 MHz
PD5102-6-5/3	475-512 MHz



PD5102-6-4NF

PD5102-6-4NFD

PD5102-6-5

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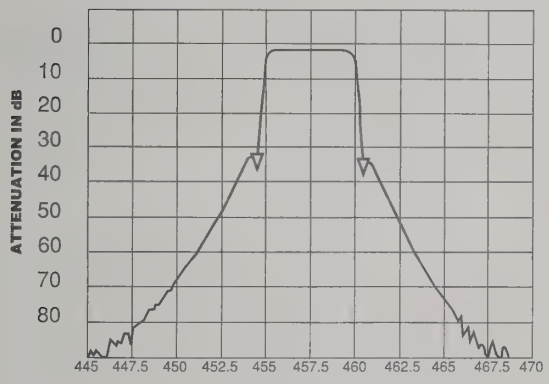
UHF Receive Filters

ELECTRICAL SPECIFICATIONS	PD5102-6-4NF	PD5102-6-4NFD	PD5102-6-5
Frequency Range - MHz	450-470	450-470	406-512
Number of Resonators	6	6*	6
Insertion Loss - dB	2.5	3 (max.)	1.5
0.5 dB Bandwidth - MHz	4	Dual 4 MHz Passband	5
Return Loss - dB (min.)	15	15	15
Connectors	N-Female	N-Female	N-Female
Temperature Range - F°(C°)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)

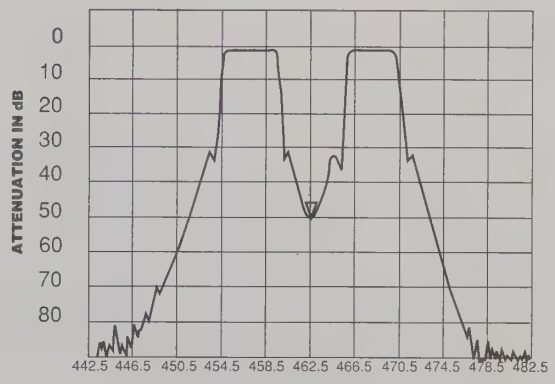
**Each filter consists of 6 resonators*

MECHANICAL SPECIFICATIONS	PD5102-6-4NF	PD5102-6-4NFD	PD5102-6-5
Height - in. (mm)	5.25(193)	7.0(178)	3.5(89)
Width - in. (mm)	10.0(4.5)	15.125(384)	15.125(384)
Depth - in. (mm)	19.0(483) Tray	19.0(483) Tray	19.0(483) Tray
Weight- lbs. (kg)	4.5(2.05)	10.0(4.55)	5.0(2.27)
Shipping Weight - lbs. (kg)	11.5(5.2)	17.0(7.7)	10.0(4.53)
Shipping Volume - ft.³ (m³)	2.9(.082)	2.9(.082)	2.6(.073)
Shipping Mode	UPS	UPS	UPS

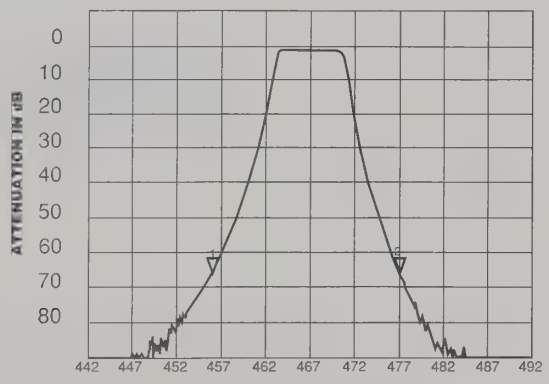
5102-6-4NF Response Curve



5102-6-4NFD Response Curve



5102-6-5 Response Curve



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Combline Bandpass Duplexers/Filter

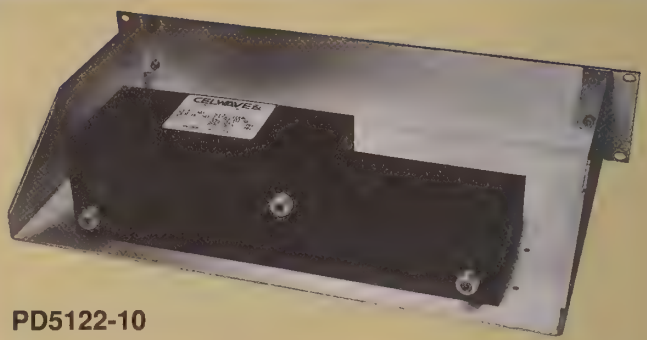
PD5134-10*	806-866 MHz
PD5134-10T*	851-866 MHz
PD5122-10*	890-960 MHz
PD5134-18*	806-869 MHz

***Exact Tx and Rx frequencies must be specified.**

These combline bandpass filters are designed specifically for 800 and 900 MHz trunking applications.

The PD5134-10 and the PD5134-18 are compact duplexers covering 10 MHz and 18 MHz, respectively, of the lower trunking band. Construction is of copper plated aluminum with copper resonators. The PD5134-10 and PD5134-18 duplexers and the PD5134-10T transmit filter, all mount on a 3-1/2" x 19" rack panel.

The PD5122-10 duplexer is for 900 MHz trunking applications. The units feature low insertion loss and have power handling capability of 500 Watts. Typical response curves are shown below.



PD5122-10

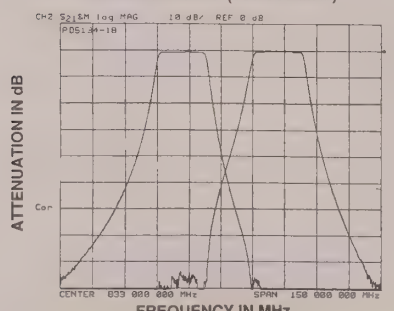
PD5134-10

ELECTRICAL SPECIFICATIONS	PD5122-10	PD5134-18	PD5134-10	PD5134-10T
Tx Frequency Range - MHz	935-941	851-869	851-869	851-869
Rx Frequency Range - MHz	896-902	806-824	806-824	—
Frequency Spacing - MHz	39	45	45	—
Bandwidth - MHz	10	18	10	10
Continuous Power Input - Watts	500	400	400	400
Insertion Loss Tx - Ant - dB	1.0	1.2	1.0	1.0
Insertion Loss Rx - Ant - dB	1.0	1.2	1.0	—
Tx Noise Suppression at Rx Frequency - dB	70	75	85	80
Rx Isolation at Tx Frequency - dB	70	75	95	—
Maximum VSWR	1.5:1	1.5:1	1.5:1	1.5:1
Impedance - Ohms	50	50	50	50
Connector	N-female	N-female	N-female	N-female
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)

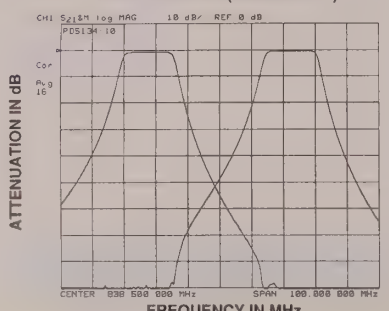
MECHANICAL SPECIFICATIONS	PD5122-10	PD5134-18	PD5134-10	PD5134-10T
Height - in. (mm)	3-1/2 (89)	3-1/2 (89)	3-1/2 (89)	3-1/2 (89)
Width - in. (mm)	19 (483)	19 (483)	19(483)	19 (483)
Depth - in. (mm)	10 (254)	10 (254)	10 (254)	10 (254)

Mounts in standard 19 in. (483 mm) E.I.A. Rack Panel.

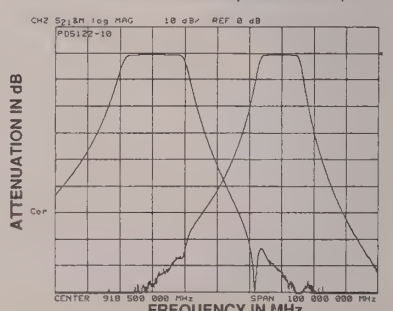
PD5134-18 RESPONSE CURVE (Typical)
45 MHz SPACING (806-869 MHz)



PD5134-10 RESPONSE CURVE (Typical)
45 MHz SPACING (806-866 MHz)



PD5122-10 RESPONSE CURVE (Typical)
39 MHz SPACING (890-960 MHz)



Cellular Transmit Filters

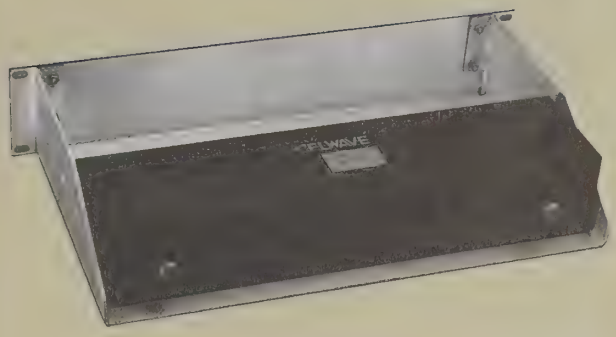
PD5192-14N*	**Wireline**
PD5192-25N*	**Non-Wireline**
PD5192-14L*	**Wireline**
PD5192-25L*	**Non-Wireline**

***Exact frequencies must be specified.**

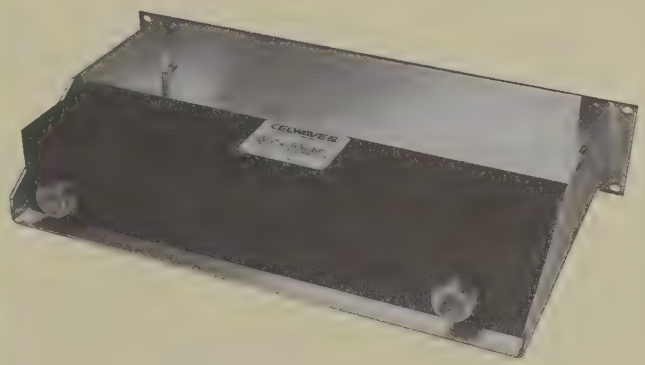
This series of specially designed transmit filters is available for AMPS cellular wireline and non-wireline applications. The PD5192-14N and PD5192-25N are mid-power filters with 800 Watts maximum power handling capability. The PD5192-14L and PD5192-25L are high power filters with 1200 Watt power capability. The PD5192 Series provides Tx noise suppression of at least 50 dB at 849 MHz and less than .5 dB insertion loss for maximum ERP. All filters are constructed with a unique design to provide exceptional protection from the higher voltage levels of added spectrum channels. LC connectors on the -L versions are standard.

- **Expanded spectrum compatible** — Broadbanded, available for either wireline or non-wireline.
- **Low loss** — Maximizes range, minimizes effects of heating.
- **Compact 3.5" vertical rack space** — Minimizes cell site space requirements.
- **High Tx suppression** — Minimizes transmitter noise to improve system performance.

WHEN ORDERING:
Provide bandwidth and frequencies, (Beginning and End).



PD5192-25N



PD5192-14L

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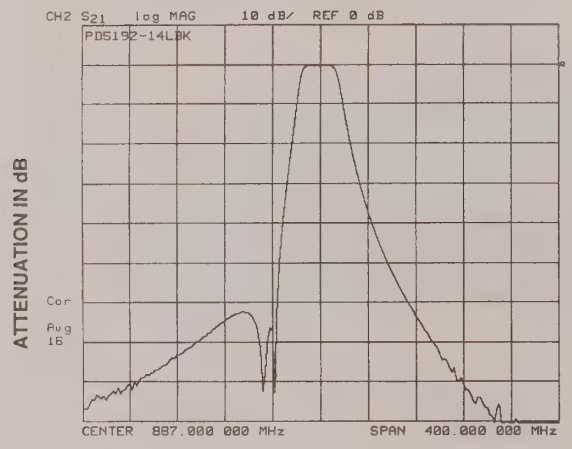
Cellular Transmit Filters

ELECTRICAL SPECIFICATIONS	PD5192-14N	PD5192-14L	PD5192-25N	PD5192-25L
Frequency Range - MHz	880-894	880-894	869-894	869-894
Bandwidth - MHz	14	14	25	25
Insertion Loss - dB	<.50	<.50	<.50	<.50
Return Loss - dB	15	15	15	15
Attenuation @ 849 - dB	>60	>60	>50	>50
Power - Watts max.	800	1200	800	1200
VSWR max.	1.5:1	1.5:1	1.5:1	1.5:1
Impedance - Ohms	50	50	50	50
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)

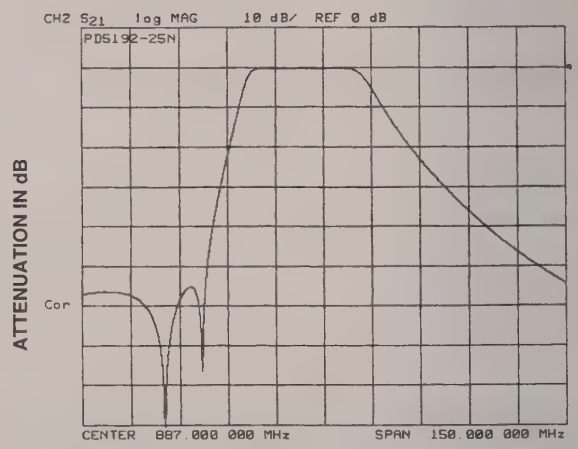
MECHANICAL SPECIFICATIONS	PD5192-14N	PD5192-14L	PD5192-25N	PD5192-25L
Height - in. (mm)	3-1/2 (89)	3-1/2 (89)	3-1/2 (89)	3-1/2 (89)
Width - in. (mm)	19 (483)	19 (483)	19 (483)	19 (483)
Depth - in. (mm)	12 (305)	12 (305)	12 (305)	12 (305)
Weight - lbs. (kg)	7-3/4 (3.5)	7-3/4 (3.5)	7-3/4 (3.5)	7-3/4 (3.5)
Connectors	N-female	LC-female	N-female	LC-female

Mounts in Standard 19 in. (483 mm) E.I.A. Rack Panel.

PD5192-14 RESPONSE CURVE



PD5192-25 RESPONSE CURVE



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Wireline Receive Filter

PD5094-14BA* Wireline Replacement

***Exact frequencies must be specified.**

This Receive filter is specially designed as a direct replacement for the filter furnished with AT&T cellular systems. The PD5094-14BA provides enhanced receiver performance by providing increased attenuation at 851 MHz and at the top end of the non-wireline band without significantly increasing passband insertion loss. The slide-in design of this filter enables system designers the latitude of upgrading without extensive reworks.

- **Higher selectivity** — Improves system performance over standard filter.
- **Low loss** — Improved noise level for system users.
- **Easy retrofit** — Quick installation, lower labor costs.

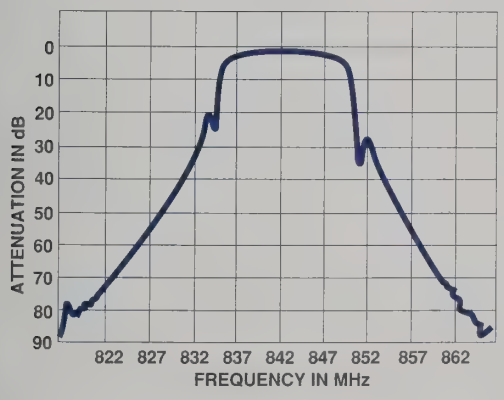
WHEN ORDERING:
Provide bandwidth and frequencies (Beginning and End)

PD5094-14BA

ELECTRICAL SPECIFICATIONS	PD5094-14BA	
Frequency Range - MHz	835-849	
Bandwidth - MHz	14	
Insertion Loss - dB	@ 835.02 MHz @ 835.65 MHz @ 842 MHz @ 849 Mhz	3.5 max. 2.0 max. 1.0 max. 2.0 max.
VSWR	1.5:1 max.	
Return Loss - dB	15 min.	
Impedance - Ohms	50	
Attenuation - dB	@ 834.36 MHz @ 851 MHz @ 869 MHz @ 880 MHz	20 min. 25 min. 90 min. 90 min.
Temperature - °F (°C)	-22 to +140 (-30 to +60)	

MECHANICAL SPECIFICATIONS	
Height - in. (mm)	2-3/16 (55.5)
Width - in. (mm)	22-1/4 (565)
Depth - in. (mm)	6 (152.4)
Weight - lbs. (kg)	5-3/4 (2.58)
Connectors	N-female

PD5094-14BA RESPONSE CURVE



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E AMPS Wireline & Non Wireline Filters

PD5185-2 **Wireline**
PD5195-1 **Non Wireline**

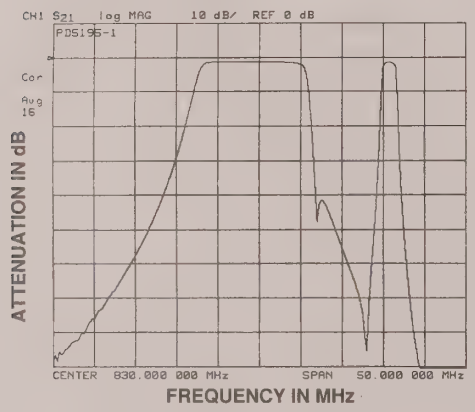
The 5195-1 is a composite filter for cellular non wireline receiver applications. The filter assembly employs a conventional combline band pass filter covering 824-835 MHz and a dielectric band pass filter covering 845-846.5 MHz. Paralleling the two gives a double passband response which covers the non wireline A and A' bands.

The 5185-2 dielectric notch filter is composed of 5 dielectric resonators. The filter maximizes the notch attenuation between 845 and 846.5 MHz, reducing possible intermodulation in the receiver front end due to interference from non wireline subscriber units.

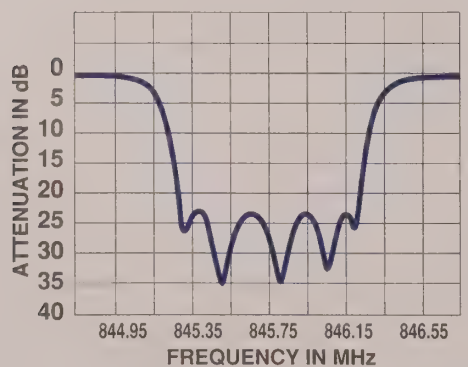
- **Highly selective** Minimizes interference from competing carrier.

PD5185 Patent No.s 4,862,122 and 4,896,125

PD5195-1 RESPONSE CURVE



PD5185-2 RESPONSE CURVE



PD5195-1

PD5185-2

ELECTRICAL SPECIFICATIONS	PD5185-2	PD5195-1
Reject Frequency Band - MHz	845-846.5	—
Bandpass Frequency - MHz	835-845, 846.5-849	824-835, 845-846.5
Insertion Loss - dB		
@ 835/849 MHz	.3 max.	—
@ 845/846.5 MHz	1.0 max.	—
@ Room Temperature	—	2.3 max.
@ Extreme Temperature	—	2.5 max.
Return Loss - dB	14 min.	14 min.
Attenuation Typical - dB	1 MHz 20 dB Notch BW	@821 16 @837 35 @844.2 35 @847.2 40
Impedance - Ohms	50	50
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)

MECHANICAL SPECIFICATIONS	PD5185-2	PD5195-1
Dimensions - in. (mm) W x H x D Rack Mountable Tray	19 x 7 x 18 (483 x 178 x 457)	19 x 7 x 18 (483 x 178 x 457)
Weight - lbs. (kg)	25 (11)	25 (11)
Connectors	N-female	N-female
Mounts in Standard 19 in. (483 mm) E.I.A. Rack Panel.		

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Cellular Receive Filter

PD5198 **Wireline**

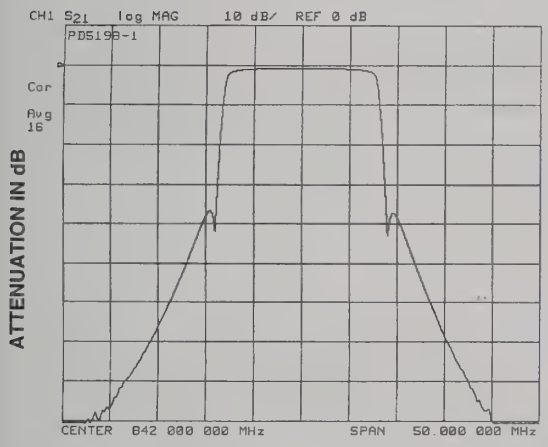
This Celwave wireline filter is specially designed for sharp attenuation of the "A" cellular band. The land-mobile and SMR frequencies are rejected by a minimum of 35 dB above 851 MHz. This combline filter uses a unique, folded design to save space.

- **Compact** — Reduces cell site equipment requirements.
- **Low loss** — Maximizes signal reception.
- **High stability** — Eliminates retuning.
- **High selectivity** — Lowers noise levels.

PD5198

WHEN ORDERING:
Provide bandwidth and frequencies (Beginning and End)

PD5198 RESPONSE CURVE



FREQUENCY IN MHz

ELECTRICAL SPECIFICATIONS		PD5198
Frequency Range - MHz		835-849
Bandwidth - MHz		14
Insertion Loss- dB	@ 835 @ 845 @ 849	1.6 max. .95 max. 1.6 max.
Return Loss - dB		15
Attenuation - dB	@ 833 @ 851	35 min. 35 min.
VSWR, Max.		1.5:1
Impedance - Ohms		50
Temperature - °F (°C)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)

MECHANICAL SPECIFICATIONS	PD5198
Height - in. (mm)	4-1/8 (105)
Width - in. (mm)	6-1/4 (159)
Depth - in. (mm)	12-3/4 (324)
Weight - lbs. (kg)	6-1/2 (2.9)
Connectors	N-female

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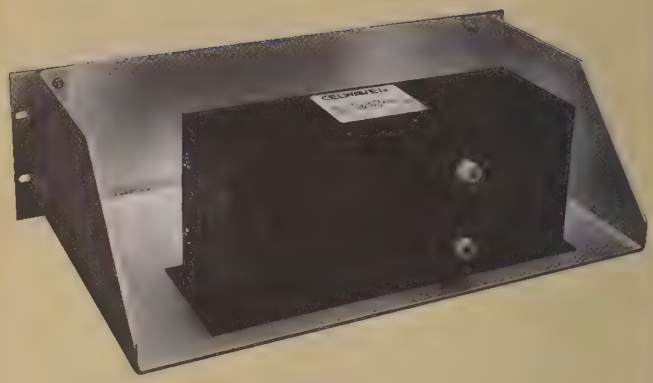
Combline Bandpass Filter

PD5182-1 **900 MHz Trunking**

This Celwave unit has been specifically designed for 900 MHz trunking receive applications. Rack mountable, it features a special notch to attenuate extended spectrum wireline Tx frequencies allowing co-location with cellular systems.

- **High selectivity** — Minimizes trunking Rx desense.
- **Low loss** — Provides minimum system noise.
- **High isolation** — Affords maximum protection from other services.

WHEN ORDERING:
Provide bandwidth and frequencies (Beginning and End)

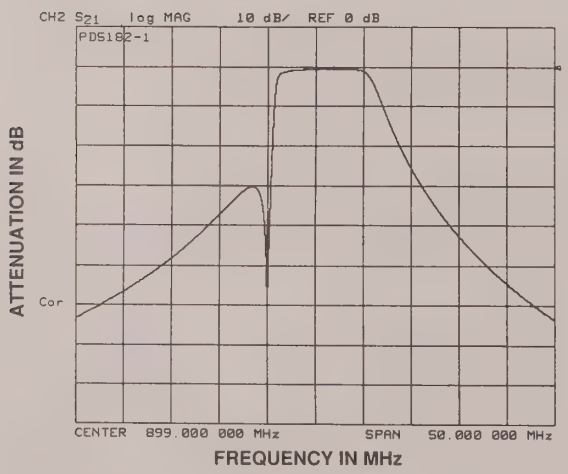


PD5182-1

ELECTRICAL SPECIFICATIONS		PD5182-1
Frequency - MHz		896-902
Bandwidth - MHz		6
Insertion Loss - dB		1.5 max.
Return Loss - dB		15 min.
Attenuation - dB	@ 894 MHz	25 min.
	@ 928 MHz	65 min.
Temperature Range - °F (°C)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)

MECHANICAL SPECIFICATIONS	PD5182-1
Dimensions - in. (mm) W x H x D	19 x 5-1/4 x 8 (483 x 133 x 203)
Connectors	N-female
Mounts in Standard 19 in. (483 mm) Rack Panel.	

PD5182 RESPONSE CURVE (896-902 MHz)



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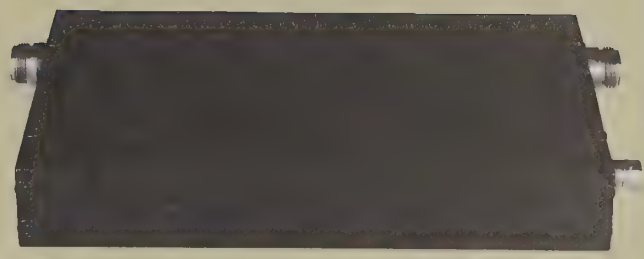
Cellular Preselectors

CFX836-6N*	**Non-wireline**
CFX836-8N*	**Non-wireline**
CFX836-8W*	**Non-wireline**
CFX842-6*	**Wireline**
CFX842-8*	**Wireline**

***Exact frequencies must be specified.**

These compact units are designed for use in AMPS cellular expanded frequency receiver multicoupling systems as direct replacements for an existing 10 MHz preselector. The CFX836 models (Bandwidth: 22.5 and 25 MHz) and the CFX842 models (Bandwidth: 14 MHz) accomodate expanded frequencies. Standard units have six proximity coupled resonators. Eight resonator versions increase attenuation at 851 MHz. All units feature copper plated construction, superb temperature compensation and maintain rated specifications from ⁻22° to ⁺140°F.

- **Low loss** — Enhanced performance in high RF density areas.
- **Copper plating** — Inhibits corrosion, reduces intermodulation susceptibility.
- **Test port** — Easy sampling of Rx signals without system interruption.



CFX842-6N

CFX836-8N

ELECTRICAL SPECIFICATIONS	CFX836-6N	CFX836-8N	CFX836-8W	CFX842-6	CFX842-8
Frequency Range - MHz	824-846.5	824-846.5	824-849	835-849	835-849
Number of Resonators	6	8	8	6	8
Insertion Loss - dB	1.0	1.5	1.0	1.5	1.4
0.5 dB Bandwidth - MHz	22.5	22.5	25	14	14
Return Loss - dB (min.)	15	15	15	15	15
Connectors	N-female	N-female	N-female	N-female	N-female
Temperature Range - °F (°C)	⁻22 to ⁺140 (⁻30 to ⁺60)				

MECHANICAL SPECIFICATIONS	CFX836-6N	CFX836-8N	CFX836-8W	CFX842-6	CFX842-8
Height - in. (mm)	1-1/4 (31.8)	1-5/16 (33.3)	1-5/16 (33.3)	1-1/4 (31.8)	1-5/16 (33.3)
Width - in. (mm)	5 -1/4 (133.4)	10-6/64 (256.3)	10-6/64 (256.3)	9-3/5 (243.8)	10-6/64 (256.3)
Depth - in. (mm)	8-1/2 (216)	4-3/4 (120.7)	4-3/4 (120.7)	5-1/4 (133.4)	4-3/4 (120.7)
Weight - lbs. (kg)	2-1/4 (1.01)	2-1/4 (1.01)	2-1/4 (1.01)	2-1/4 (1.01)	2-1/4 (1.01)

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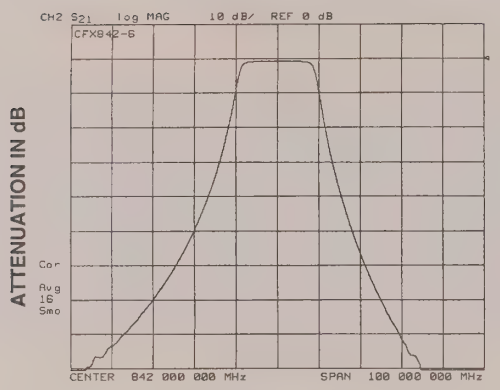
Cellular Preselectors

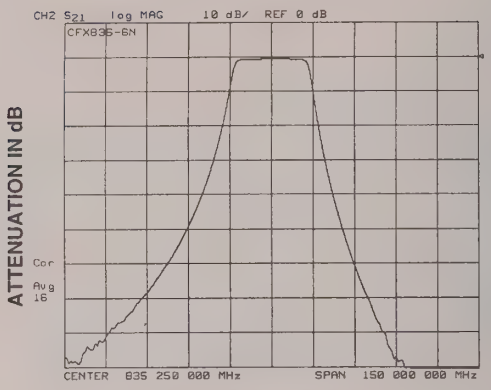
CFX842-6 RESPONSE CURVE



ATTENUATION IN dB

FREQUENCY IN MHz

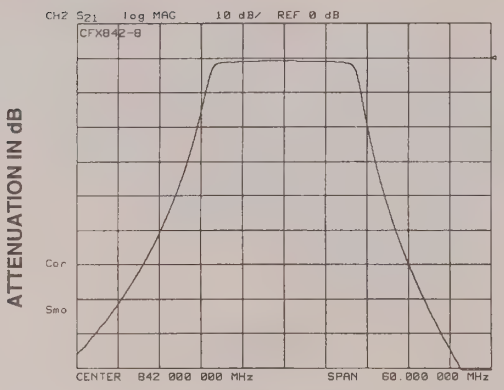
CFX836-6N RESPONSE CURVE



ATTENUATION IN dB

FREQUENCY IN MHz

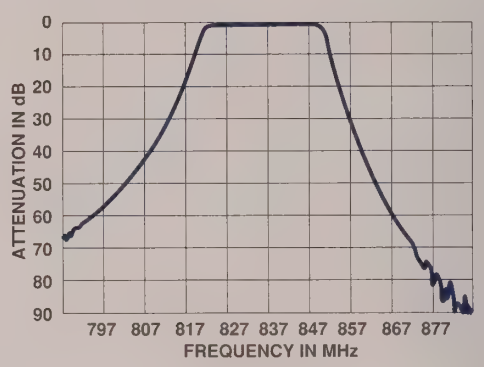
CFX842-8 RESPONSE CURVE



ATTENUATION IN dB

FREQUENCY IN MHz

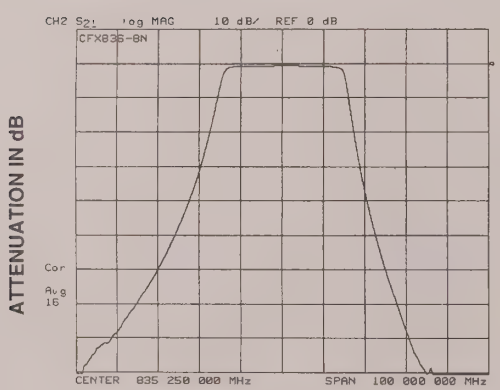
CFX836-6W RESPONSE CURVE



ATTENUATION IN dB

FREQUENCY IN MHz

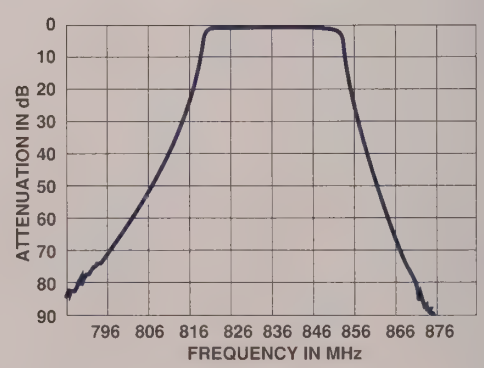
CFX836-8N RESPONSE CURVE



ATTENUATION IN dB

FREQUENCY IN MHz

CFX836-8W RESPONSE CURVE



ATTENUATION IN dB

FREQUENCY IN MHz

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GSM and EGSM Duplex Filter

FD9042-1 **890-960 MHz**
FD9042-2 **880-960 MHz**

These GSM and EGSM Duplex Filters utilize two integrated combline band pass filters. Their new, enhanced design features very low insertion loss and guaranteed low intermodulation, taking up only 1 rack unit in a standard 19" rack.

- **Low insertion loss** — Maximizes system performance.
- **Low intermodulation** — Minimizes interference.
- **Compact design** — Minimizes use of rack space.

FD9042-1

Ordering Information

Item Number	Frequency Range - MHz
FD9042-1	890-960 MHz
FD9042-2	880-960 MHz

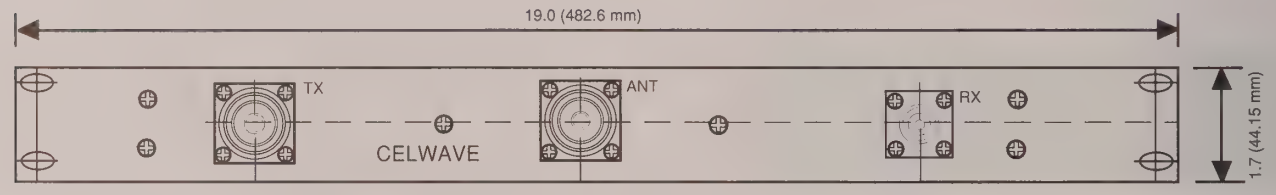
WHEN ORDERING:
Provide bandwidth and frequencies (Beginning and End)

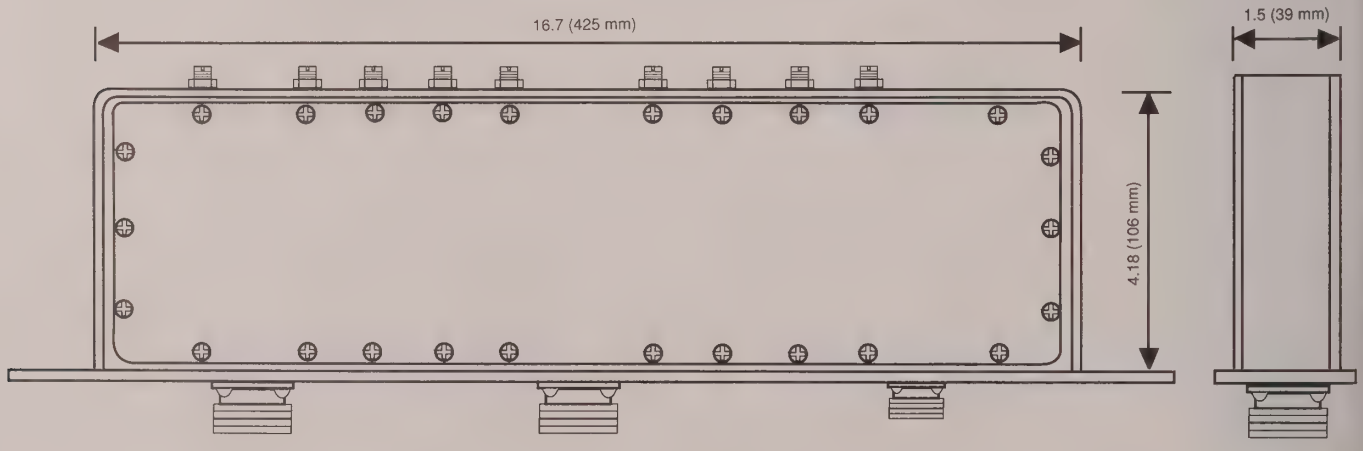
GSM and EGSM Duplex Filters

ELECTRICAL SPECIFICATIONS	FD9042-1	FD9042-2
Frequency Range, Rx - MHz	890-915	880-915
Frequency Range, Tx - MHz	935-960	925-960
Spacing - MHz	45	45
Bandwidth - MHz	25	35
Insertion Loss, Max. - dB	0.5 (Typ. 0.3)	0.5 (Typ. 0.3)
Isolation Rx - Tx, Min. - dB	40	30
Isolation Tx - Rx, Min. - dB	40	30
Power Cont., Max./RMS - Watts	350	350
VSWR/Return Loss, Min. - dB	1.3:1/18	1.3:1/18
Connector Type* - Tx Output Rx	7/16 Female 7/16 Female N-Female	7/16 Female 7/16 Female N-Female
Passband Ripple, Max. - dB	0.4 (Typ. 0.2)	0.4 (Typ. 0.2)
Operating Temperature Range - °F(°C)	-14 to +140(-10 to +60)	-14 to +140(-10 to +60)
3rd Order Intermodulation at 2 x 43 - dBm	< -119	< -119

**N-Female, 7/16 and SMA in any combination available on request, contact Celwave Sales Engineering for more information*

MECHANICAL SPECIFICATIONS	FD9042-1	FD9042-2
Dimensions - WxHxD in. mm.	19.0x1.5x4.18 482.6x39x106	19.0x1.5x4.18 482.6x39x106
Weight - lbs.(kg)	6.8(3.1)	6.8(3.1)
Mounting	19", 1HU	19", 1HU
Shipping Dimensions -WxLxH in. mm.	20.1x22.04x3.5 (2 pcs.) 510x560x90 (2 pcs.)	20.1x22.04x3.5 (2 pcs.) 510x560x90 (2 pcs.)
Shipping Weight - lbs. (kg)	8.82(4.0) (1 pc.)	8.82(4.0) (1 pc.)





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DCS and PCS Duplex Filters

FD1842 **1710-1880 MHz**
FD1942 **1850-1990 MHz**

These DCS and PCS Duplex Filters use two integrated combline bandpass filters. They feature very low insertion loss and guaranteed low intermodulation. Both units are compact in size and fit into a standard 19" rack.

- **Low insertion loss** — Maximizes system performance.
- **Compact design** — Minimizes use of rack space.
- **Low intermodulation** — Minimizes interference.

Ordering Information

Item Number	Frequency Range - MHz
FD1842-1	1710-1880 MHz
FD1942-1	1850-1990 MHz

WHEN ORDERING:
Provide bandwidth and frequencies (Beginning and End)

FD1842

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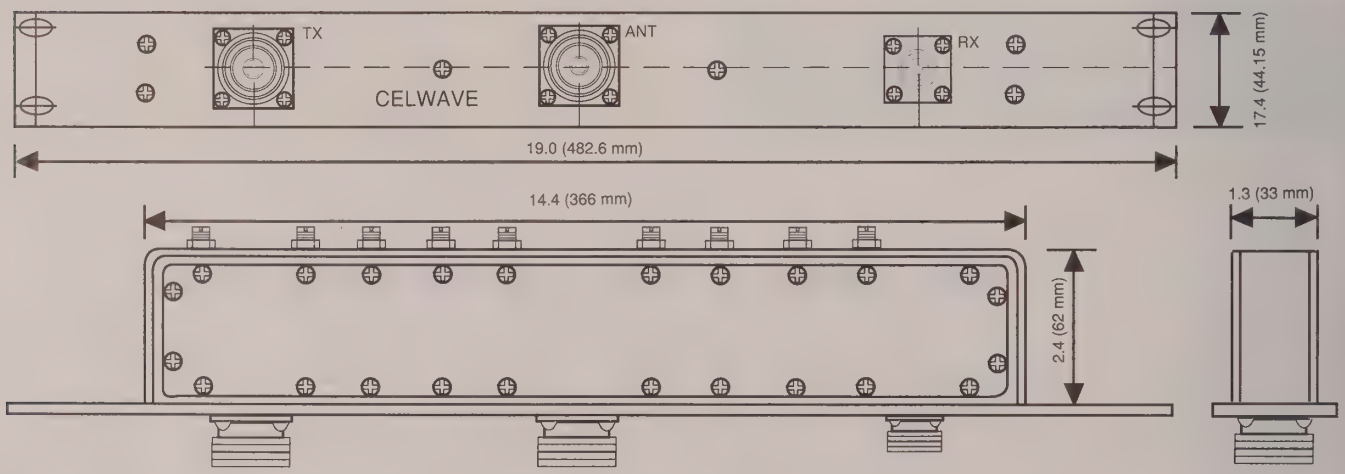
DCS and PCS Duplex Filters

ELECTRICAL SPECIFICATIONS	FD1842-1	FD1942-1
Frequency Range, Rx - MHz	1710-1785	1850-1910
Frequency Range, Tx - MHz	1805-1880	1930-1990
Bandwidth - MHz	75	60
Spacing - MHz	95	80
Continuous Power, Max./RMS - Watts	250	250
Insertion Loss, Max. - dB	0.5 (Typ.0.3)	0.5 (Typ.0.3)
Rx Isolation at Tx Freq., Min. - dB	30	30
Tx Isolation at Rx Freq., Min. - dB	30	30
Passband Ripple, Max. - dB	0.4 (Typ.0.2)	0.4 (Typ.0.2)
VSWR/Return Loss, Min. - dB	1.3:1/18	1.3:1/18
Temperature Range - °F(°C)	-14 to +140(-10 to +60)	-14 to +140(-10 to +60)
3rd Order IMD at 2 x 38 dBm - dBm	<-120	<-120

MECHANICAL SPECIFICATIONS	FD1842-1	FD1942-1
Dimensions - WxHxD in. mm.	19.0x1.3x2.4 482x33x62	19.0x1.3x2.4 482x33x62
Weight - lbs. (kg)	3.0(1.3)	3.0(1.3)
Connector Type* - Tx ANT Rx	7/16 Female 7/16 Female N-Female	7/16 Female 7/16 Female N-Female
Mounting	19", Standard Rack	19", Standard Rack
Shipping Dimensions - WxHxD in. mm.	20x22x3.5 (2 pcs.) 510x560x90 (2 pcs.)	20x22x3.5 (2 pcs.) 510x560x90 (2 pcs.)
Shipping Weight - lbs. (kg)	4.9 (2.2) (1 pc.)	4.9 (2.2) (1 pc.)

** N-Female, 7/16 and SMA in any combination available on request. Contact Celwave Sales Engineering.*



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DCS and PCS Rx Bandpass Filters

FB18102-2 **DCS Bandpass**
FB19102-2 **PCS Bandpass**

These DCS and PCS Bandpass Rx-Filters are designed to meet low insertion loss, and feature a 10 pole combline design that is all silver plated to ensure low insertion loss.

- **Low insertion loss** — Maximizes system performance.
- **High isolation** — Minimizes transmitter interference.
- **Compact** — Minimizes use of rack space.

FB19102-2

Ordering Information

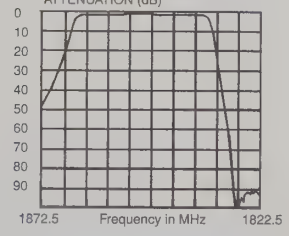
Item Number	Frequency Range - MHz
FB18102-2	1710-1785 MHz
FB19102-2	1850-1910 MHz

ELECTRICAL SPECIFICATIONS	FB18102-2	FB19102-2
Frequency Range - MHz	1710-1785	1850-1910
Insertion Loss - dB	1.2	
Attenuation* at 1805-1880 MHz, Min. - dB	50, see curve 1A	-
Attenuation* at 1930-1990 MHz, Min. - dB	-	50, see curve 1B
VSWR (50Ω) all ports, Max. - dB	1.3:1	
Passband Ripple, Max. - dB	0.7	
Temperature Range - F°(C°)	-14 to +140(-10 to +60)	
Connector	Type N-Female**	

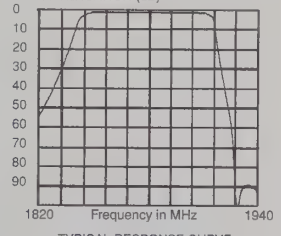
MECHANICAL SPECIFICATIONS	FB18102-2	FB19102-2
Dimensions - WxHxD - in.(mm)	14.5 x 1.2 x 3.6(370 x 31 x 93)	
Weight - lbs.(kg)	2.4 (1.074)	

* Attenuation above 2 GHz, see curve 2.
**Connector can be changed to meet special customer requirements. Contact Celwave Sales Engineering.

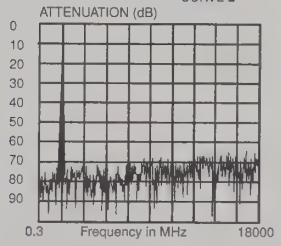
FB18102-2 RESPONSE CURVE (TYP) CURVE 1A



FB19102-2 RESPONSE CURVE (TYP) CURVE 1B



TYPICAL RESPONSE CURVE CURVE 2



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DCS and PCS Tx Bandpass Filters

FB18102-1 **DCS Bandpass**
FB19102-1 **PCS Bandpass**

These DCS and PCS Bandpass Rx-Filters are designed to meet high power requirements and high rejection at the DCS and PCS Rx band, and feature a 10 pole combline design, with 2 rejects, that is all silver plated to ensure low insertion loss.

- **Low insertion loss** — Maximizes system performance.
- **High isolation** — Minimizes transmitter IM.
- **Compact** — Minimizes use of rack space.

FB19102-1

Ordering Information

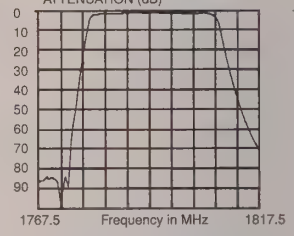
Item Number	Frequency Range - MHz
FB18102-1	1805-1880 MHz
FB19102-1	1930-1990 MHz

ELECTRICAL SPECIFICATIONS	FB18102-1	FB19102-1
Frequency Range - MHz	1805-1880	1930-1990
Insertion Loss - dB	1.2	
Attenuation* at 1710-1785 MHz, Min. - dB	80, see curve 1A	-
Attenuation* at 1850-1910 MHz, Min. - dB	-	80, see curve 1B
Power, Max. - Watts	250	
VSWR (50Ω) all ports, Max. - dB	1.3:1	
Passband Ripple, Max. - dB	0.7	
Temperature Range - F°(C°)	-14 to +140(-10 to +60)	
3rd Order IM at 2 x 43 dBm - dBm	< -110	
Connector	Type N-Female**	

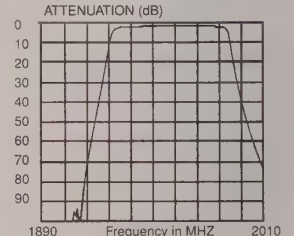
MECHANICAL SPECIFICATIONS	FB18102-1	FB19102-1
Dimensions - WxHxD - in.(mm)	14.5 x 1.2 x 3.6 (370 x 31 x 93)	
Weight - lbs.(kg)	2.4 (1.074)	

* Attenuation above 2 GHz, see curve 2.
**Connector can be changed to meet special customer requirements. Contact Celwave Sales Engineering.

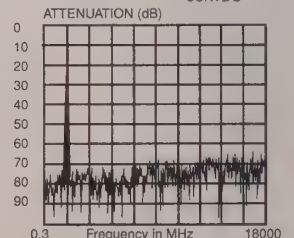
FB18102-1 RESPONSE CURVE
(TYP) CURVE 1A



FB19102-1 RESPONSE CURVE
(TYP) CURVE 1B



TYPICAL RESPONSE CURVE
CURVE 2



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Dual Notch Duplexers

PD506-0*	66-88 MHz
PD506-1*	136-174 MHz
PD506-2*	220-225 MHz

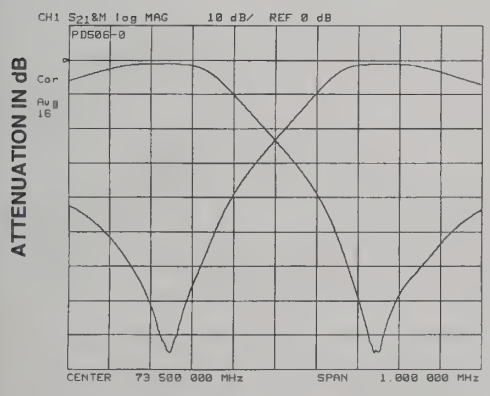
***Exact Tx and Rx frequencies must be specified.**

The PD506 series duplexers use two dual notch pass-reject cavities in each channel which incorporates a unique loop structure to minimize the number of cable-to-connector joints and provide the simplest possible harnessing arrangement.

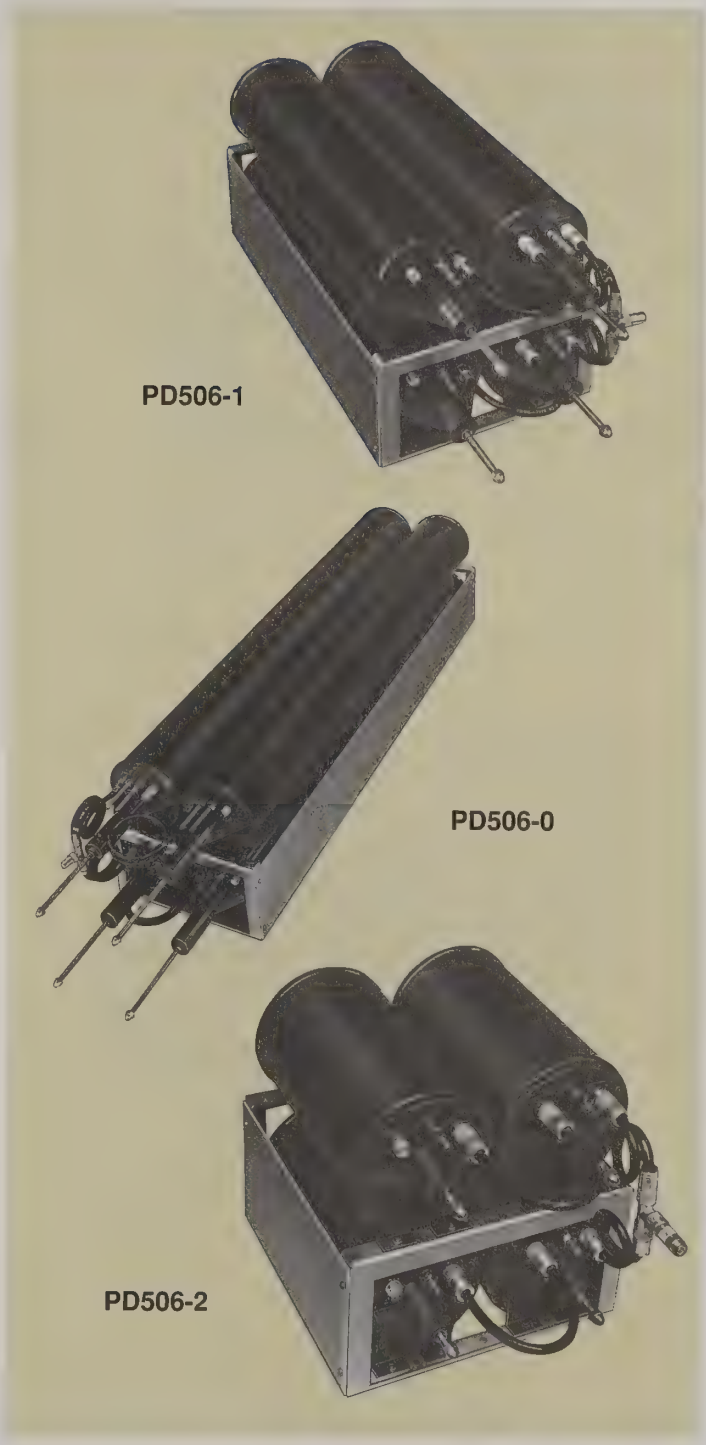
These units have a pseudo bandpass characteristic which is particularly noticeable at wider frequency spacings. The result is high Tx-Rx isolation at frequencies between and adjacent to operating frequencies. Isolation characteristic can be enhanced at close spacings by increasing coupling and therefore insertion loss to greater values. Brackets for mounting on either vertical or horizontal surfaces are supplied.

- **Low loss** — Maximizes system performance.
- **Temperature compensated** — Assures consistent performance across temperature and power range.
- **High isolation** — Minimizes interference.

PD506-0 RESPONSE CURVES (Typical)
.500 MHz SPACING
(66-88 MHz)



FREQUENCY IN MHz



DUPLEXER

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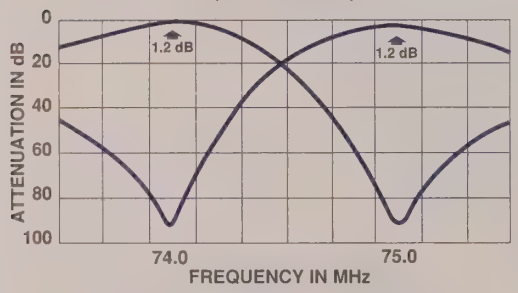
Dual Notch Duplexers

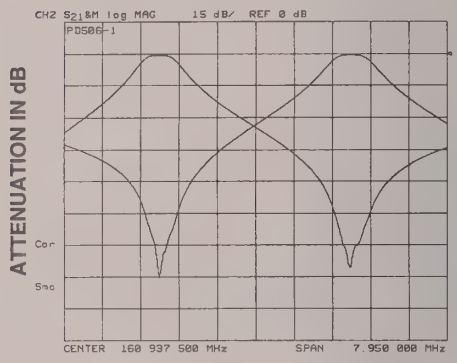
ELECTRICAL SPECIFICATIONS	PD506-0	PD506-0	PD506-1	PD506-1	PD506-2
Frequency Range - MHz	66-88	66-88	136-174	136-174	220-225
Frequency Spacing, Min. - MHz	.500	1	.600	5	1.6
Continuous Power Input - Watts	180	350	180	350	300
Insertion Loss Tx-Ant. - dB	1.5	1.2	2.0	0.8	1.0
Insertion Loss Rx-Ant. - dB	1.5	1.2	2.0	0.8	1.0
Tx Noise Supression at Rx Frequency - dB	80	85	80	85	85
Rx Isolation at Tx Frequency - dB	80	85	80	85	85
VSWR - Max.	1.3:1	1.3:1	1.3:1	1.3:1	1.3:1
Impedence - Ohms	50	50	50	50	50
Connector	N-female	N-female	N-female	N-female	N-female
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60))				

MECHANICAL SPECIFICATIONS	PD506-0	PD506-0	PD506-1	PD506-1	PD506-2
Height - in. (mm)	13 (330)	13 (330)	13 (330)	13 (330)	13 (330)
Width - in. (mm)	13 (330)	13 (330)	13 (330)	13 (330)	13 (330)
Maximum Length - in. (mm)	70 (1778)	70 (1778)	35 (889)	35 (889)	27 (685)
Weight - lbs. (kg)	65 (29.5)	65 (29.5)	45 (20.4)	45 (20.4)	40 (18.1)

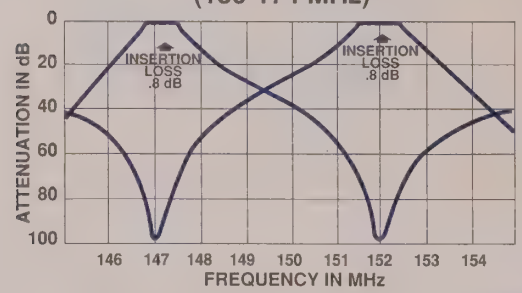
PD506-0 RESPONSE CURVES (Typical)
1 MHz SPACING
(66-88 MHz)



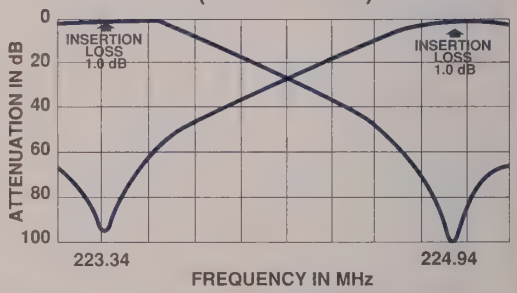
PD506-1 RESPONSE CURVES (Typical)
0.600 MHz SPACING
(136-174 MHz)



PD506-1 RESPONSE CURVES (Typical)
5 MHz SPACING
(136-174 MHz)



PD506-2 RESPONSE CURVES (Typical)
1.6 MHz SPACING
(220-225 MHz)



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Dual Notch Duplexers

PD497-0*	66-88 MHz
PD497-1*	136-174 MHz
PD1157*	406-512 MHz

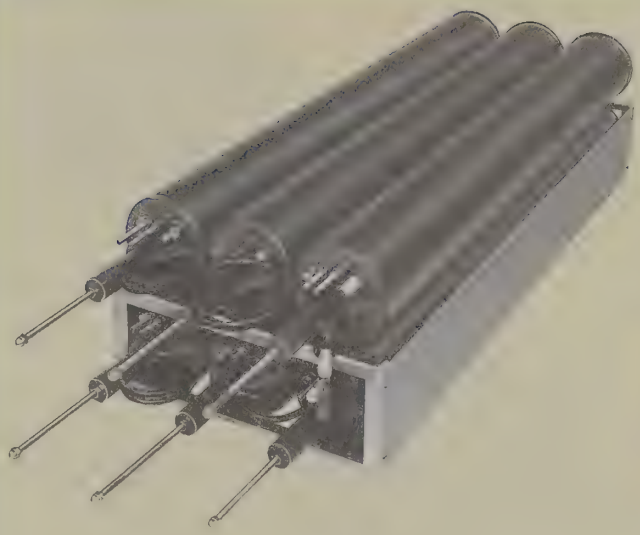
***Exact Tx and Rx frequencies must be specified.**

These units incorporate a unique loop structure which provides for a minimum number of cable connector joints and the most simple harnessing arrangement possible. Their dual notch circuitry provides a pseudo band pass characteristic resulting in high Tx-Rx isolation at frequencies between and adjacent to the operating frequencies.

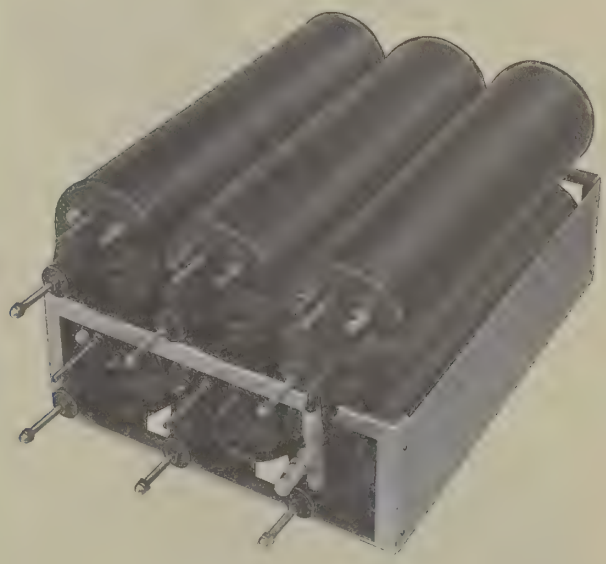
The PD1157 operates in the three quarter-wave mode to allow closer Tx-Rx spacing while maintaining excellent isolation and insertion loss. PD497 units are supplied with brackets for mounting on either vertical or horizontal surfaces.

- **Low loss** — Maximizes system performance.
- **High isolation** — Minimizes interference.
- **Fully temperature compensated** — Assures consistent performance across temperature and power range.

WHEN ORDERING:
Provide transmit frequency, receive frequency. Check Tx/Rx spacing (per catalog specified minimum spacing).



PD497-0



PD1157

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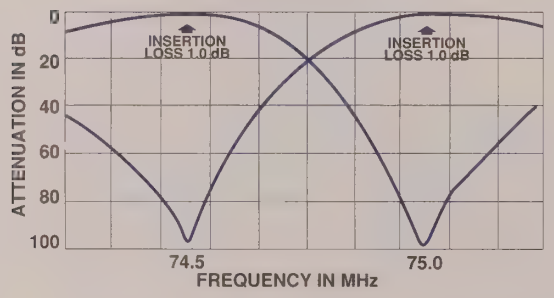
Dual Notch Duplexers

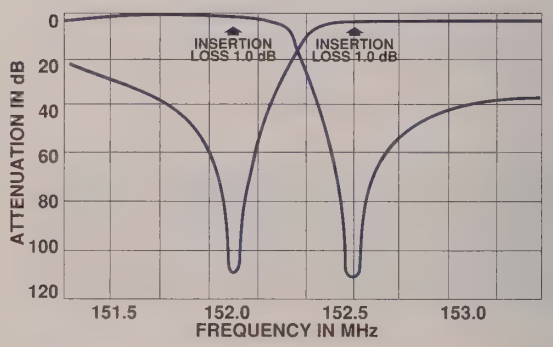
ELECTRICAL SPECIFICATIONS	PD497-0	PD497-1	PD497-1	PD497-1	PD1157
Frequency Range - MHz	66-88	136-174	136-174	136-174	406-512
Frequency Spacing - MHz	.500	.500	.500	2	.500
Continuous Input Power - Watts	350	350	200	350	200
Insertion Loss - dB	1.0	1.0	2.0	1.0	2.2
Insertion Loss Rx - Ant. - dB	1.0	1.0	2.0	1.0	2.2
Tx Noise Suppression at Rx Frequency - dB	100	100	115	120	80
Rx Isolation at Tx Frequency - dB	100	100	115	120	80
VSWR - Max.	1.3:1	1.3:1	1.3:1	1.3:1	1.3:1
Impedance - Ohms	50	50	50	50	50
Connector	N-female	N-female	N-female	N-female	N-female
Temperature Range - °F (°C)			$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		

MECHANICAL SPECIFICATIONS	PD497-0	PD497-1	PD497-1	PD497-1	PD1157
Cavity Diameter - in. (mm)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)
Height - in. (mm)	13 (330)	13 (330)	13 (330)	13 (330)	13 (330)
Width - in. (mm)	19-1/4 (489)	19-1/4 (489)	19-1/4 (489)	19-1/4 (489)	19-1/4 (489)
Length - in. (mm)	70 (1778)	35 (889)	35 (889)	35 (889)	35 (889)
Weight - lbs. (kg)	110 (49.5)	60 (27)	60 (27)	60 (27)	60 (27)

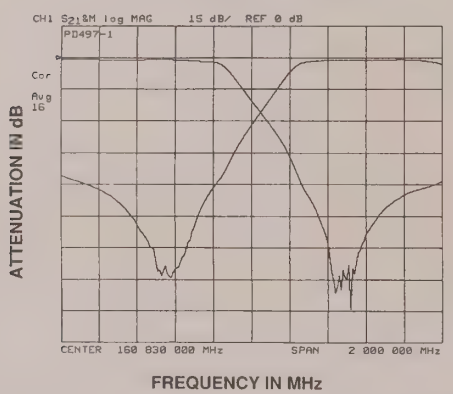
PD497-0 RESPONSE CURVES (Typical)
.500 MHz SPACING
(66-88 MHz)



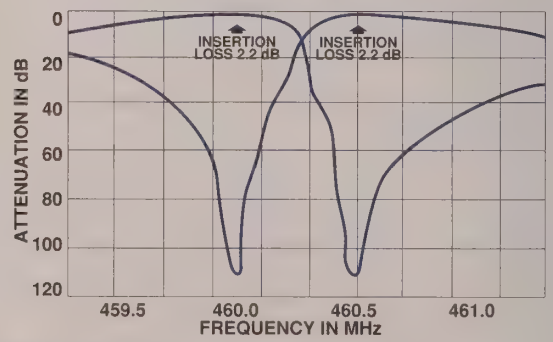
PD497-1 RESPONSE CURVES (Typical)
.500 MHz SPACING
(136-174 MHz)



PD497-1 RESPONSE CURVES (Typical)
2 MHz SPACING
(136-174 MHz)



PD1157 RESPONSE CURVES (Typical)
.500 MHz SPACING
(406-512 MHz)



CELWAVE®
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Compact Base Station Duplexers

PD638* 66-512 MHz
PD5085* 138-174 MHz
***Exact Tx and Rx frequencies must be specified.**

Celwave's PD638 and PD5085 duplexers are ideal for repeater and base station applications where higher input power and compact dimensions are essential. These duplexers are capable of handling up to 150 Watts of continuous input power.

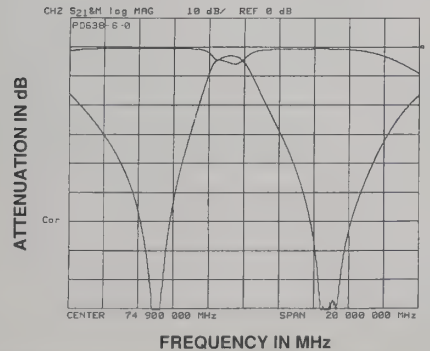
The PD638 Series features include an all brass construction providing exceptional electrical stability and physical durability. Low loss solid shield copper jacketed intercabling also enhance this stability. The PD5085 uses a unique resonator design to reduce the overall length of the duplexer by 50% from standard resonator designs.

- **Low loss** Maximizes system performance.
- **Compact** Minimizes use of space.
- **Brass construction** Maximizes electrical stability.

Ordering Information
(Exact frequencies must be specified.)

Item Number	Frequency Range-MHz
PD638-6-0	66-88
PD638-6-1	150-174
PD638-6-2	220-225
PD638-6-4	406-470
PD638-6-5	470-512
PD638	406-470
PD5085-1	138-150 (3 MHz)
PD5085-2	138-150 (5 MHz)
PD5085-3	150-162 (3 MHz)
PD5085-4	150-162 (5 MHz)
PD5085-5	162-174 (3 MHz)
PD5085-6	162-174 (5 MHz)

PD638-6-0 RESPONSE CURVES (Typical)
5 MHz SPACING (66-88 MHz)



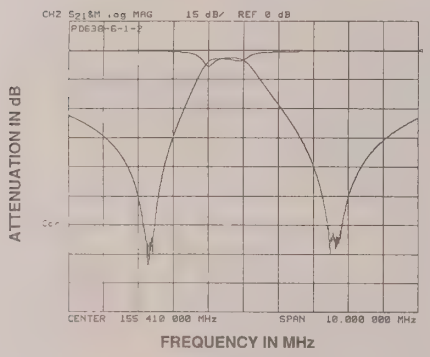
Compact Base Station Duplexers

ELECTRICAL SPECIFICATIONS	PD638-6-0	PD638-6-1	PD638-6-2	PD638-6-4	PD638-6-5	PD638	PD5085
Frequency Range - MHz	66-88	150-174	220-225	406-470	470-512	406-470	138-174
Frequency Spacing - MHz	5 to 10	3 to 5	1.6	5 to 12	3 to 5	5 to 12	3 to 5
Continuous Power Input - Watts	100	150	100	100	65	100	100
Insertion Loss, Tx - Ant. - dB*	1.2	1.2	1.8	1.2	1.7	0.8	1.4 (max.)
Insertion Loss, Tx - Ant. - dB*	1.2	1.2	1.8	1.2	1.7	0.8	1.4 (max.)
Tx Noise Suppression at Rx Frequency - dB*	70	75	75	75	75	60	75
Rx Isolation at Tx Frequency - dB*	70	75	75	75	75	60	75
VSWR - Max.	1.5:1	1.3:1	1.3:1	1.3:1	1.3:1	1.3:1	1.3:1
Impedance - Ohms	50	50	50	50	50	50	50
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)						
Connector	N-female	N-female	N-female	N-female	N-female	N-female	N-female

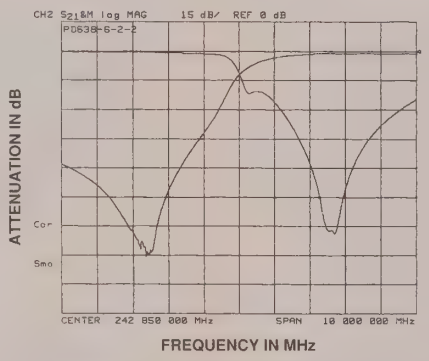
*@ Minimum Frequency Spacing.

MECHANICAL SPECIFICATIONS	PD638-6-0	PD638-6-1	PD638-6-2	PD638-6-4	PD638-6-5	PD638	PD5085
Height - in. (mm)	1-3/4 (44.5)	1-3/4 (44.5)	1-3/4 (44.5)	1-3/4 (44.5)	1-3/4 (44.5)	1-3/4 (44.5)	1-3/4 (44.5)
Width - in. (mm)	9-1/16 (230)	9-1/16 (230)	9-1/16 (230)	9-1/16 (230)	9-1/16 (230)	6-1/32 (153)	8-1/2 (216)
Length - in. (mm)	10-3/4 (273)	22-1/2 (572)	16-1/2 (419)	10-1/4 (206)	10-1/4 (206)	10-1/4 (206)	11 (279)
Weight - lbs. (kg)	7-5/8 (3.5)	13 (59)	11-1/4 (5.1)	6-1/4 (2.8)	6-1/4 (2.8)	4-3/4 (2.1)	4-1/2 (2.1)

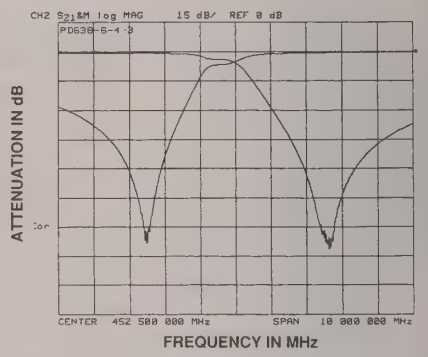
PD638-6-1 RESPONSE CURVES (Typical) 5 MHz SPACING (150-174 MHz)



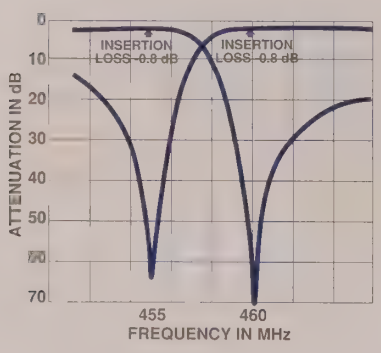
PD638-6-2 RESPONSE CURVES (Typical) 1.6 MHz SPACING (220-225 MHz)



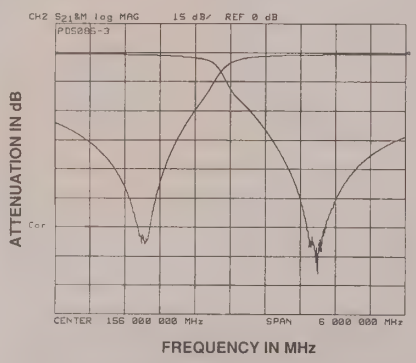
PD638-6-4 RESPONSE CURVES (Typical) 5 MHz SPACING (406-470 MHz)



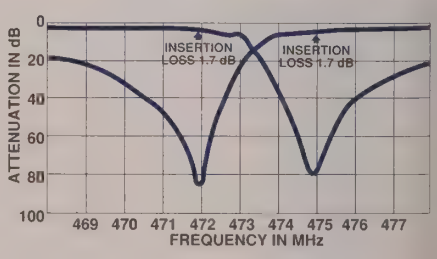
PD638 RESPONSE CURVES (Typical) 5 MHz SPACING (406-470 MHz)



PD5085 RESPONSE CURVES (Typical) 3 MHz SPACING (138-174 MHz)



PD638-6-5 RESPONSE CURVES (Typical) 3 MHz SPACING (470-512 MHz)



Miniplexer™ Pass Reject Duplexers

PD7340*	**4 Cavity**	144-160 MHz
PD7360*	**6 Cavity**	144-160 MHz
PD7440*	**4 Cavity**	155-174 MHz
PD7460*	**6 Cavity**	155-174 MHz

***Exact Tx and Rx frequencies must be specified.**

With its small size, the Miniplexer solves the space problem in a wide variety of applications including VHF car telephones, vehicular repeaters and repeater base stations. Their design and construction features include solid shield copper jacketed intercabling for low loss and extruded aluminum cavities for durability. All units are field tunable by qualified personnel, rated at 50 Watts and able to maintain rated specifications from -22° to +140°F.

- **Compact** — Minimizes space requirements.
- **Extruded aluminum cavities** — Ensures durability.
- **Low loss** — Maximizes system performance.

WHEN ORDERING:
Provide transmit frequency, receive frequency. Check Tx/Rx spacing (per catalog specified minimum spacing).

PD7360/PD7460

PD7340/PD7440

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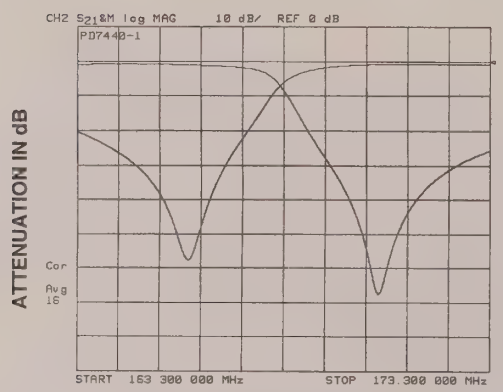
Miniplexer™ Pass Reject Duplexers

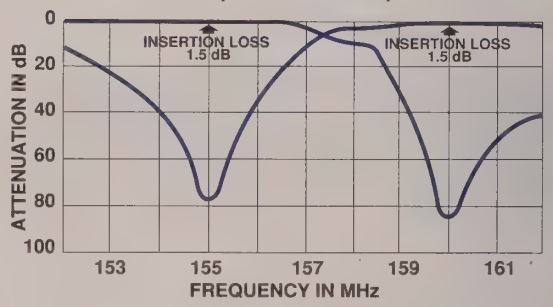
ELECTRICAL SPECIFICATIONS	PD7340	PD7440	PD7360	PD7460
Frequency Range - MHz	144-160	155-174	144-160	155-174
Frequency Spacing (min.) - MHz	4.5	4.5	4.5	4.5
Continuous Power Input - Watts	50	50	50	50
Insertion Loss Tx -Ant. - dB	1.3	1.3	1.5	1.5
Insertion Loss Rx -Ant. - dB	1.3	1.3	1.5	1.5
Tx Noise Supression at Rx Frequency - dB	50	50	70	70
Rx Isolation at Tx Frequency - dB	50	50	70	70
Maximum VSWR (50 Ohms)	1.5:1	1.5:1	1.5:1	1.5:1
Impedence - Ohms	50	50	50	50
Connector Type	BNC-female	BNC-female	BNC-female	BNC-female
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)	-22 to +140 (-30 to +60)

MECHANICAL SPECIFICATIONS	PD7340	PD7440	PD7360	PD7460
Height - in. (mm)	1-1/4 (31.8)	1-1/4 (31.8)	1-1/4 (31.8)	1-1/4 (31.8)
Width - in. (mm)	4-1/8 (105)	4-1/8 (105)	6-3/16 (157)	6-3/16 (157)
Length - in. (mm)	4-3/8 (111)	4-3/8 (111)	4-3/8 (111)	4-3/8 (111)
Weight - lbs. (kg)	1 (.5)	1 (.5)	1-1/2 (0.7)	1-1/2 (0.7)

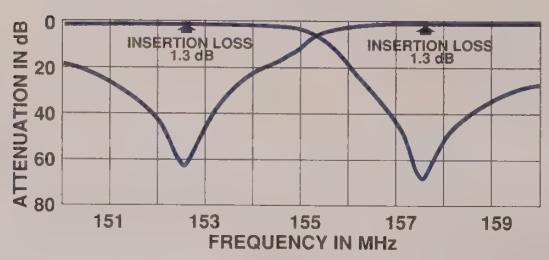
PD7440 RESPONSE CURVES (Typical)
5 MHz SPACING
(155-174 MHz)



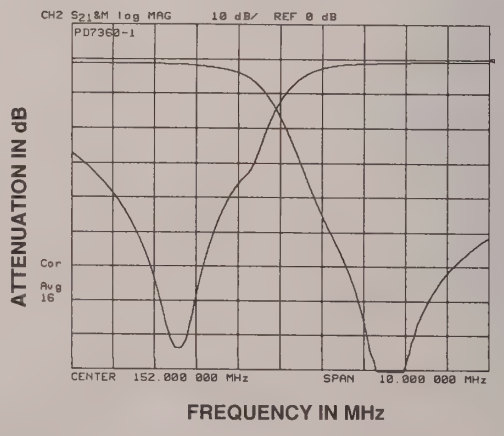
PD7460 RESPONSE CURVES (Typical)
5 MHz SPACING
(155-174 MHz)



PD7340 RESPONSE CURVES (Typical)
4.5 MHz SPACING
(144-160 MHz)



PD7360 RESPONSE CURVES (Typical)
5 MHz SPACING
(144-160 MHz)



VHF Compact Duplexers

PD636A* **4 Cavity**
PD636-6A* **6 Cavity**
***Exact Tx and Rx frequencies must be specified.**

Celwave's PD636A uses two capacitively tuned, temperature compensated helical resonators in the receiver channel and two more in the transmit channel. The resonators are housed in a compact 6063-T6 irridited aluminum extrusion that is painted for additional protection.

Our PD636-6A has six resonator cavities to provide additional isolation. Unique construction features include solid shield copper jacket Teflon® inter-cabling for low loss and stability.

- **Low loss** — Maximizes system performance.
- **High Isolation** — Minimizes interference.
- **Unique construction** — For low loss and system stability.

Teflon® is a registered trademark of Du Pont.

Ordering Information

Item Number	Frequency Range - MHz	Connector
636A-1-1	144-155*	UHF
636A-1-2	144-155*	N
636A-1-3	144-155*	BNC
636A-2-1	155-162*	UHF
636A-2-2	155-162*	N
636A-2-3	155-162*	BNC
636A-3-1	162-174*	UHF
636A-3-2	162-174*	N
636A-3-3	162-174*	BNC
636-6A-1	144-155*	UHF
636-6A-2	155-162*	N
636-6A-3	162-174*	BNC

***Exact Tx and Rx frequencies must be specified.**

WHEN ORDERING:
Provide transmit frequency, receive frequency. Check Tx/Rx spacing (per catalog specified minimum spacing).

PD636A

PD636-6A

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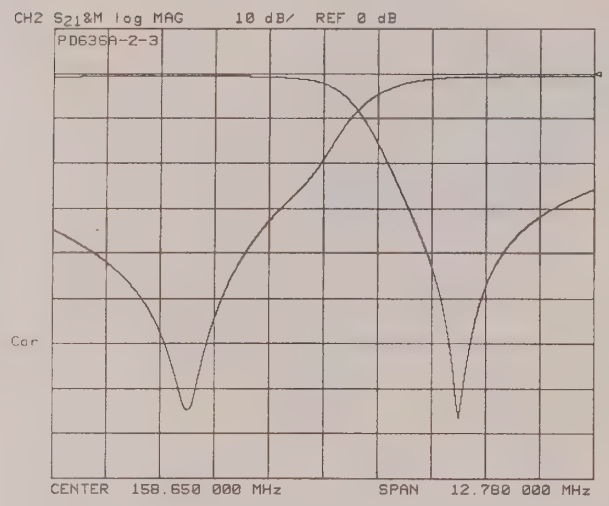
VHF Compact Duplexers

PD636A RESPONSE CURVES (Typical)
4.5 MHz SPACING
(144-174 MHz)



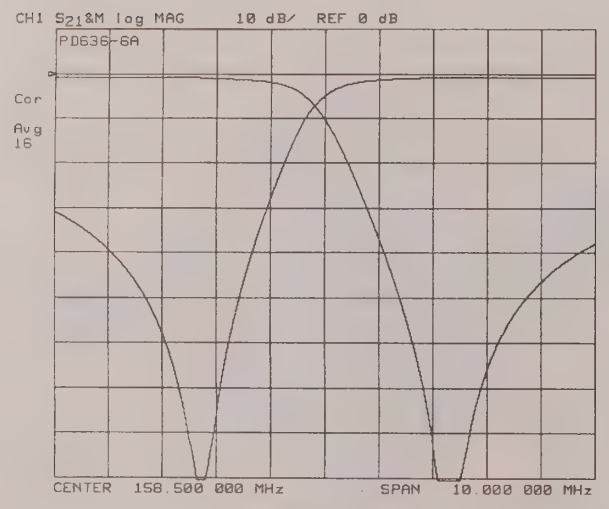
ATTENUATION IN dB

FREQUENCY IN MHz

ELECTRICAL SPECIFICATIONS	PD636A	PD636-6A
Frequency Range - MHz	144-174	144-174
Frequency Spacing - MHz	4.5	4.5
Continuous Power Input - Watts	50	50
Insertion Loss, Tx - Ant. - dB	0.8	1.2
Insertion Loss, Rx - Ant. - dB	0.8	1.2
Tx Noise Suppression at Rx Frequency - dB	60	80
Rx Isolation at Tx Frequency - dB	60	80
VSWR - Max.	1.5:1	1.5:1
Impedance - Ohms	50	50
Connector	BNC female (Std.) UHF-female or N-female (Optional)	
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)	

MECHANICAL SPECIFICATIONS	PD636	PD636-6A
Height - in. (mm)	1-1/4 (31.8)	1-1/4 (31.8)
Width - in. (mm)	4-1/8 (105)	6-1/4 (159)
Length - in. (mm)	8-1/2 (216)	8-1/2 (216)
Weight - lbs. (kg)	2 (0.9)	2.2 (1)

PD636-6A RESPONSE CURVES (Typical)
4.5 MHz SPACING
(144-174 MHz)



ATTENUATION IN dB

FREQUENCY IN MHz

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Dual Notch Duplexers

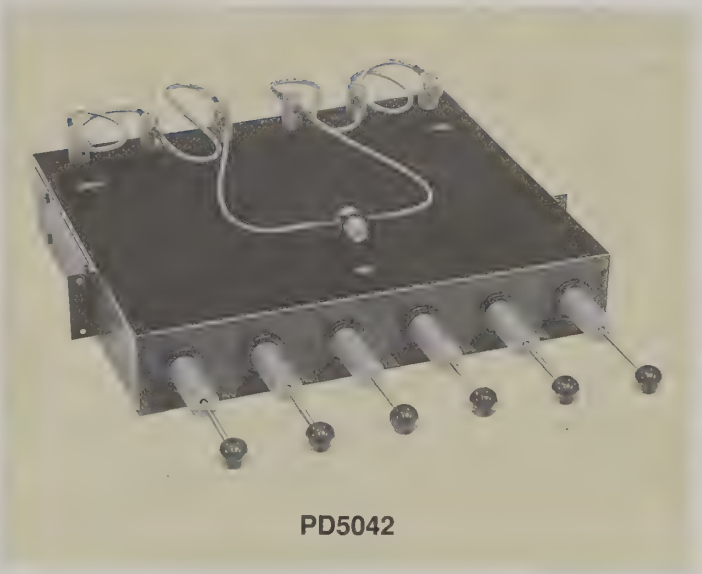
PD5042-1* 138-174 MHz
PD5042-2* 220-225 MHz
***Exact Tx and Rx frequencies must be specified.**

Celwave's PD5042 represents a family of duplexers providing frequency separation as low as 0.5 MHz and requiring less than 5 inches of vertical rack space. Its unique dual pass notch, high isolation design and small size make it ideal for base station applications.

The units feature temperature compensated copper construction and cavities that are intercabled with double shielded Teflon® jacket cable for long term product integrity.

- **High isolation** — Minimizes interference.
- **Temperature compensated** — Assures consistent performance across temperature and power range.
- **Compact** — Minimizes rack space requirements.

Teflon® is a registered trademark of Du Pont.

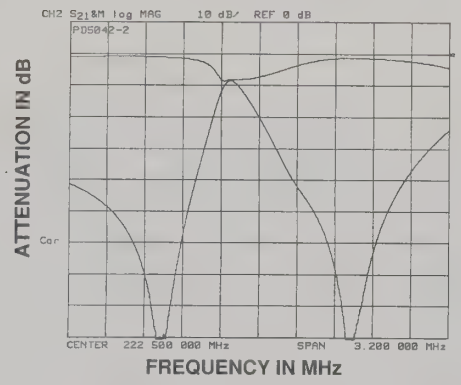


PD5042

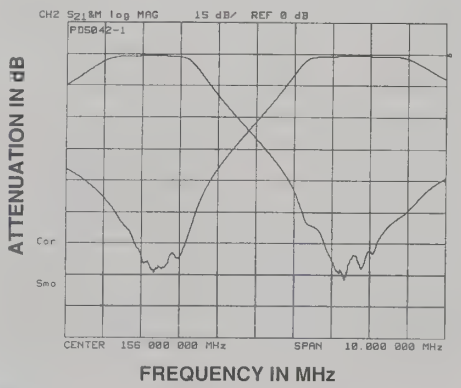
ELECTRICAL SPECIFICATIONS	PD5042-1		PD5042-2
Frequency Range - MHz	138-174		220-225
Frequency Spacing - MHz	.5 (min.)	≥5.0	1.6
Continuous Power Input - Watts	100	350	100
Insertion Loss Tx-Ant. - dB (max.)	1.8	1.0	1.3
Insertion Loss Rx-Ant. - dB (max.)	1.8	1.0	1.3
Tx Noise Suppression at Rx Frequency - dB	60	90	90
Rx Isolation at Tx Frequency - dB	60	90	90
Maximum VSWR	1.5:1	1.3:1	1.3:1
Impedance - Ohms	50	50	50
Connector Type	N-female		N-female
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)		

MECHANICAL SPECIFICATIONS	PD5042-1	PD5042-2
Height - in. (mm)	4-5/8 (118)	4-5/8 (118)
Width - in. (mm)	19 (483)	19 (483)
Length - in. (mm)	22-3/4 (578)	22-3/4 (578)
Weight - lbs. (kg)	22 (10)	22 (10)
Mounts in a standard 19 inch (483 mm) E.I.A. Rack Panel		

PD5042 RESPONSE CURVE (Typical)
1.6 MHz SPACING
(220-225 MHz)



PD5042 RESPONSE CURVE (Typical)
5.0 MHz SPACING
(138-174 MHz)



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UHF Duplexers

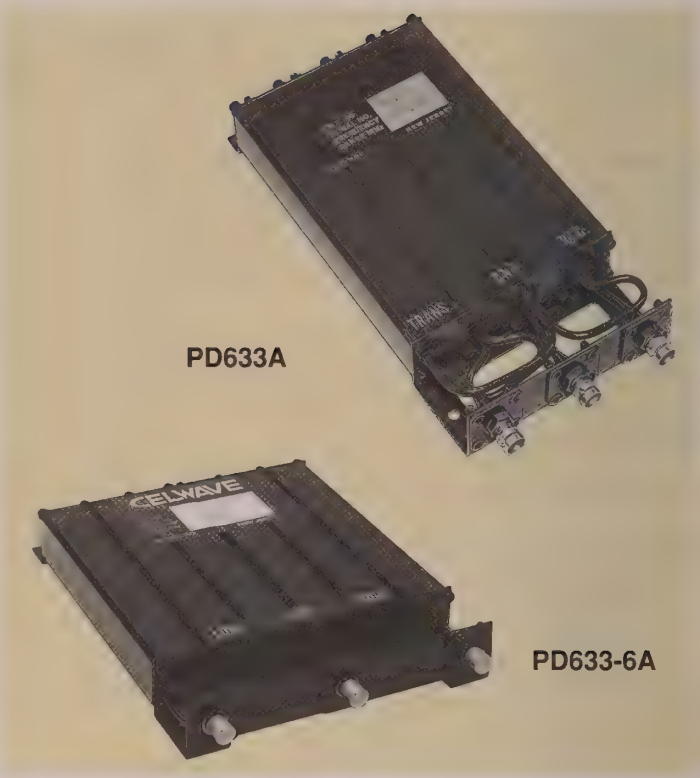
PD633A*
PD633-6A*
***Exact Tx and Rx frequencies must be specified.**

The PD633A Mobile Duplexer uses 4 capacitively tuned TEM resonators in a compact extruded 6063-T6 aluminum housing. The aluminum is iridited and the entire unit painted for additional protection. Specifications are given here for 5 MHz and 10 MHz separations.

The PD633-6A Mobile Duplexer uses 6 resonators and cabling similar to PD633A. Two additional cavities provide the added isolation required in some systems. Specifications are given here for both 5 MHz and 10 MHz separations.

Both duplexers use solid shield copper jacketed Teflon® intercabling for low loss.

- **Low loss** — Maximizes system performance.
- **High isolation** — Minimizes interference.
- **Compact** — Minimizes space requirements.



PD633A

PD633-6A

Teflon® is a registered trademark of Du Pont.

Ordering Information

Item Number	Frequency Spacing-MHz	Frequency Range-MHz
PD633A-1	5	406-440*
PD633A-2	5	440-470*
PD633A-3	5	470-512*
PD633A-4	10	406-470*
PD633A-5	10	470-512*

Item Number	Nominal Frequency Spacing-MHz	Frequency Range-MHz	Connector
PD633-6A-1	5	406-450*	BNC
PD633-6A-1N	5	406-450*	N-female
PD633-6A-2	5	450-470*	BNC
PD633-6A-2N	5	450-470*	N-female
PD633-6A-3	3	470-495*	BNC
PD633-6A-4	3	490-512*	BNC
PD633-6A-5	10	406-450*	BNC
PD633-6A-5N	10	406-450*	N-Female
PD633-6A-6	10	450-470*	BNC
PD633-6A-6N	10	450-470*	N-female
PD633-6A-7	10	470-512*	BNC
PD633-6A-7N	10	470-512*	N-Female
PD633-6A-8	10	355-406*	BNC
PD633-6A-8N	10	355-406*	N-Female
PD633-6A-9	3	470-512*	BNC
PD633-6A-9N	3	470-512*	N-Female

***Exact Tx and Rx frequencies must be specified.**

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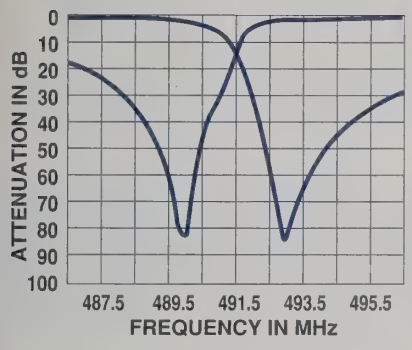
UHF Duplexers

ELECTRICAL SPECIFICATIONS	PD633A	PD633A	PD633-6A	PD633-6A
Frequency Range - MHz	406-512	406-512	406-512	355-512
Frequency Spacing - MHz	5	10	5	10
Continuous Power Input - Watts	50	50	50	50
Insertion Loss, Tx - Ant. - dB	1.2	0.8	1.4	1.2
Insertion Loss, Rx - Ant. - dB	1.2	0.8	1.4	1.2
Tx Noise Suppression at Rx Frequency - dB	50	60	75	80
Rx Isolation at Tx Frequency - dB	50	60	75	80
VSWR - Max.	1.3:1	1.3:1	1.3:1	1.3:1
Impedance - Ohms	50	50	50	50
Connector	BNC female (Std.), N-female (Optional)			
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)			

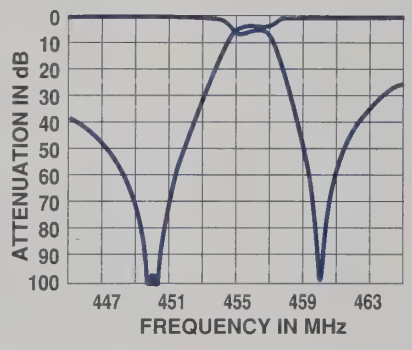
MECHANICAL SPECIFICATIONS	PD633A	PD633A	PD633-6A	PD633-6A
Height - in. (mm)	1-1/4 (31.8)	1-1/4 (31.8)	1-1/4 (31.8)	1-1/4 (31.8)
Width - in. (mm)	4-1/8 (105)	4-1/8 (105)	6-3/16 (157)	6-3/16 (157)
Length - in. (mm)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)
Weight - lbs. (kg)	2 (0.9)	2 (0.9)	3-1/2 (1.7)	3-1/2 (1.7)

DUPLEXER

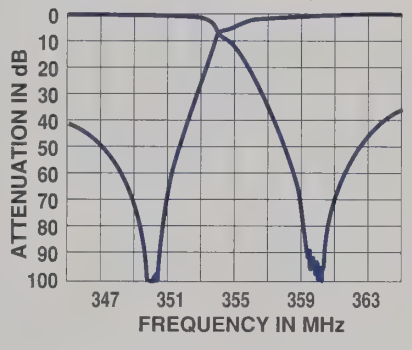
PD633-6A-4 RESPONSE CURVES 3 MHz SPACING (490-493 MHz)



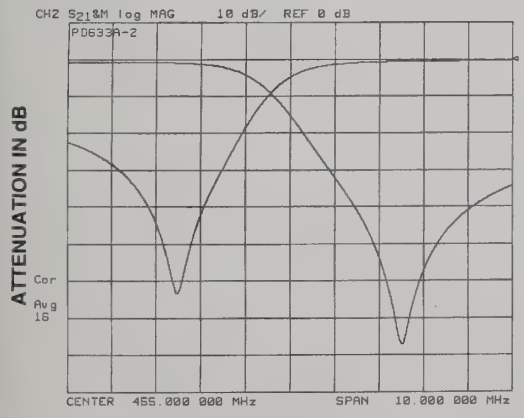
PD633-6A-6 RESPONSE CURVES 10 MHz SEPARATION (450-460 MHz)



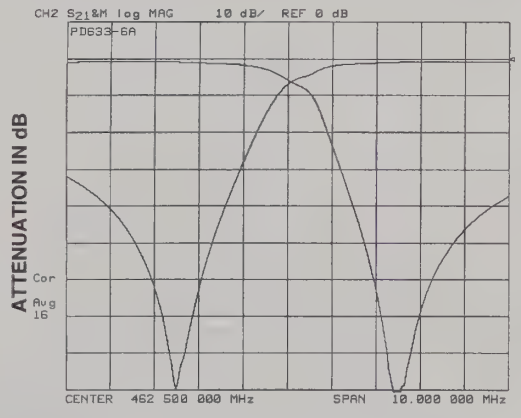
PD633-6A-8 RESPONSE CURVES 10 MHz SEPARATION (350-360 MHz)



PD633A RESPONSE CURVES (Typical) 5 MHz SEPARATION (435-470 MHz)



PD633-6A RESPONSE CURVES (Typical) 5 MHz SEPARATION (435-470 MHz)



Dual Notch High Selectivity Duplexers

PD526*

***Exact Tx and Rx frequencies must be specified.**

These Celwave units use a total of six pass-reject dual-notch resonators with three resonators per channel as the normal arrangement. They are suitable for many applications other than duplexing and their dual-notch circuitry provides a pseudo band-pass characteristic for high Tx-Rx isolation. These units are available with reversible mounting brackets to allow flush rack mounting with connections in the rear. Specify PD526-4-SR or PD526-5-SR. Intercabling is exclusively RG214/U cable.

- **High isolation** — Minimizes interference.
- **Temperature compensated** — Assures consistent performance across temperature and power range.
- **Low insertion loss** — Maximizes effective radiated power.

PD526-4-SR

Ordering Information

Duplexers

Item Number	Frequency Range-MHz
PD526-4-1	406-440*
PD526-4-2	435-470*
PD526-5	470-512*

Reverse Mount Option: Specify SR after ordering number.

Replacement Cable Kits

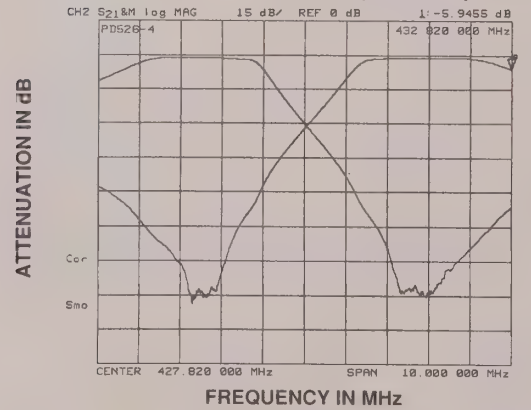
Item Number	Frequency Range-MHz
043102001	406-440
043102002	440-470
043102003	470-490
043102004	490-512

***Exact Tx and Rx frequencies must be specified.**

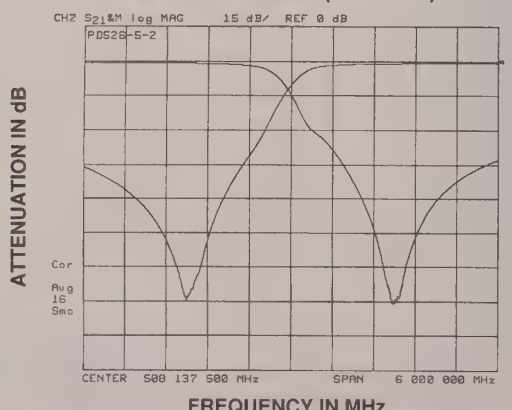
ELECTRICAL SPECIFICATIONS	PD526-4	PD526-5
Frequency Range - MHz	406-470	470-512
Frequency Spacing - MHz	5 (min.)	3 (min.)
Continuous Power Input - Watts	250	250
Insertion Loss Tx-Ant. - dB	1.0	1.0
Insertion Loss Rx-Ant. - dB	1.0	1.0
Tx Noise Suppression at Rx Frquency - dB	100	100
Rx Isolation at Tx Frequency - dB	100	100
Maximum VSWR	1.3:1	1.3:1
Impedance - Ohms	50	50
Connector Type	N-female	N-female
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)	

MECHANICAL SPECIFICATIONS	PD526-4	PD526-5
Height - in. (mm)	5-1/4 (133)	5-1/4 (133)
Width - in. (mm)	rack panel 19 (483)	rack panel 19 (483)
Depth - in. (mm)	14 (356)	14 (356)
Weight - lbs. (kg)	23 (10.5)	23 (10.5)

PD526-4 RESPONSE CURVES (Typical)
5 MHz SPACING (406-470)



PD526-5 RESPONSE CURVES (Typical)
3 MHz SPACING (470-512)



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Dual Notch Duplexers

PD696-4* 406-512 MHz
PD896* 806-960 MHz

*** Exact Tx and Rx frequencies must be specified. Specify SR for Reverse Mount Option.**

These duplexers combine two pass reject cavities in each channel. Each cavity incorporates a unique loop structure to minimize the number of cable-to-connector joints. Double shielded jumpers are used for all intercabling. The dual notch circuitry provides a pseudo bandpass characteristic at wider frequency spacings.

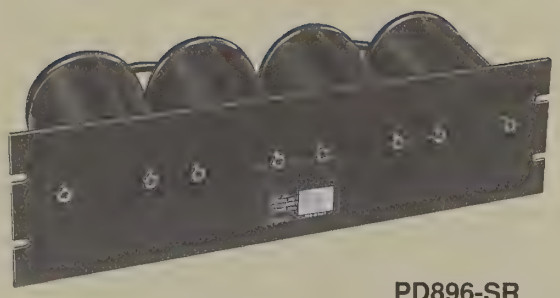
The PD696 employs four PD695 cavities for UHF applications with frequency spacings as close as 1 MHz. The PD896 uses four PD895 cavities with spacing as close as 3.6 MHz. Please consult Sales Engineering for frequency spacing other than specified.

Ordering Information

Cable Kits Item Number	Frequency Range-MHz
043102001	406-440
043102002	440-470
043102003	470-490
043102004	490-512

***Exact Tx and Rx frequencies must be specified.**

WHEN ORDERING:
Provide transmit frequency, receive frequency. Check Tx/Rx spacing (per catalog specified minimum spacing).



PD896-SR

PD696-SR

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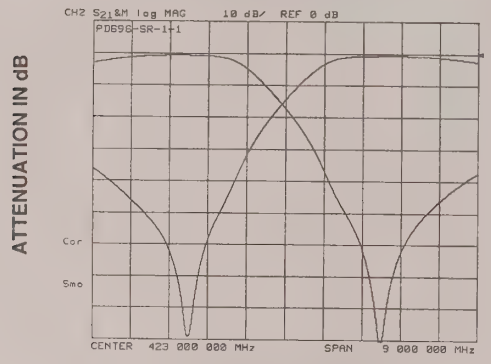
Dual Notch Duplexers

ELECTRICAL SPECIFICATIONS	PD696-1	PD696-2	PD696-3	PD896
Frequency Range - MHz	406-512	406-512	406-512	806-960
Frequency Spacing - MHz	4-12	2.5-3.5	1-2	3.6 or more
Continuous Power Input - Watts	250	150	*	100
Insertion Loss Tx-Ant. - dB	0.8**	1.2***	*	1.2
Insertion Loss Rx-Ant. - dB	0.8	1.2	*	1.2
Tx Noise Suppression at Rx Frequency - dB	85	80	*	70
Rx Isolation at Tx Frequency - dB	85	80	*	70
Maximum VSWR	1.3:1	1.5:1	1.3:1	1.3:1
Impedance - Ohms	50	50	50	50
Connector Type	N-female	N-female	N-female	N-female
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)			

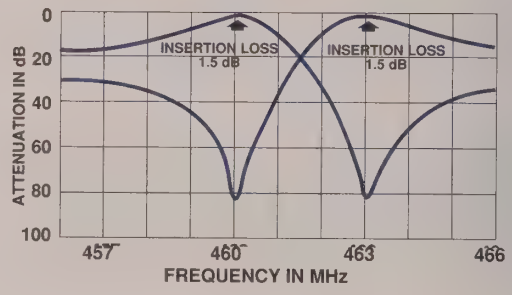
MECHANICAL SPECIFICATIONS	PD696-1	PD696-2	PD696-3	PD896
Height - in. (mm)	5-1/4 (133)	5-1/4 (133)	5-1/4 (133)	5-1/4 (133)
Width, Rack Panel - in. (mm)	19 (483)	19 (483)	19 (483)	19 (483)
Depth - in. (mm)	12 (305)	12 (305)	12 (305)	9 (229)
Weight - lbs. (kg)	23 (10.5)	23 (10.5)	23 (10.5)	21 (9.45)

* Consult Celwave Sales Engineering for specs ** Specs at 450 MHz with 5 MHz Tx-Rx separation *** Specs at 450 MHz with 3 MHz Tx-Rx separation

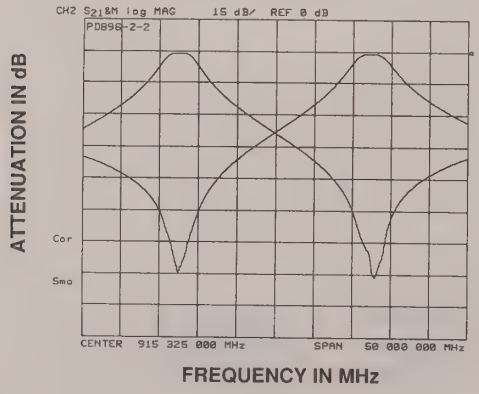
PD696-4 RESPONSE CURVES (Typical)
5 MHz SPACING
(406-512 MHz)



PD696-5 RESPONSE CURVES (Typical)
3 MHz SPACING
(406-512 MHz)



PD896 RESPONSE CURVES (Typical)
3.6 MHz SPACING
(806-960 MHz)



Miniplexer™ Pass Reject Duplexers

PD7560*	**6 Cavity**	406-440 MHz
PD7660*	**6 Cavity**	430-470 MHz

***Exact Tx and Rx frequencies must be specified.**

The small size of Celwave's Miniplexers™ solves space problems in a wide variety of applications including car phones, portable and vehicular repeaters and repeater base stations. Their design and construction features include solid shield copper jacketed intercabling for low loss and an extruded aluminum cavity for durability. BNC connectors are standard.

This UHF Duplexer Series is available in six cavity versions with two bands, either 5 or 10 MHz spacing and up to 65 dB minimum isolation. All are easiliy field tunable, rated at 50 Watts and maintain rated specifications from -22°F to +140°F.

- **Low loss** — Maximizes system performance.
- **Temperature compensated** — Ensures consistent performance across temperature range.
- **Compact** — Reduces space requirements.
- **High isolation** — Minimizes interference.

PD7560
PD7660

WHEN ORDERING:
Provide transmit frequency, receive frequency. Check Tx/Rx spacing (per catalog specified minimum spacing).

Ordering Information

Item Number	Freq. Range-MHz	Freq. Spacing-MHz
PD7560-1	406-440	5
PD7560-2	406-440	10
PD7660-1	430-470	5
PD7660-2	430-470	10

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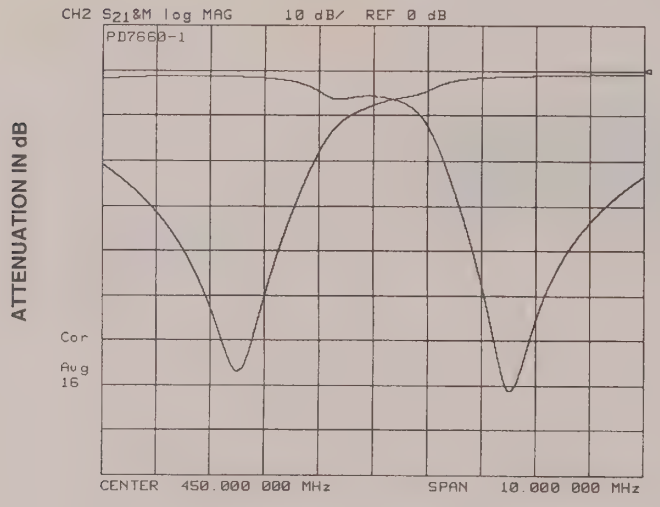
Miniplexer™ Pass Reject Duplexers

ELECTRICAL SPECIFICATIONS	PD7560-1 PD7560-2 (6 CAVITY)		PD7660-1 PD7660-2 (6 CAVITY)	
Frequency Range - MHz	406-440		430-470	
Frequency Spacing - MHz	5	10	5	10
Continuous Power Input - Watts	50	50	50	50
Insertion Loss Tx - Ant. - dB	1.5	1.2	1.5	1.2
Insertion Loss Rx - Ant. - dB	1.5	1.2	1.5	1.2
Tx Noise Suppression at Rx Frequency - dB	65	80	65	80
Rx Isolation at Tx Frequency - dB	65	80	65	80
Maximum VSWR	1.5:1	1.5:1	1.5:1	1.5:1
Impedance - Ohms	50	50	50	50
Connector Type (female)	BNC		BNC	
Temperature Range °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)			

MECHANICAL SPECIFICATIONS	PD7560 (6 CAVITY)	PD7660 (6 CAVITY)
Height - in. (mm)	1-1/4 (31.8)	1-1/4 (31.8)
Width - in. (mm)	6-1/8 (156)	6-1/8 (156)
Length - in. (mm)	4-3/8 (111)	4-3/8 (111)
Weight - lbs. (kg)	1-1/2 (0.07)	1-1/2 (0.07)

PD7660 RESPONSE CURVE (Typical)
5 MHz SPACING (430-470 MHz)



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High Selectivity, High Power Band Pass Duplexer

PD5043-8* 816-960 MHz

*** Exact Tx and Rx frequencies must be specified.**

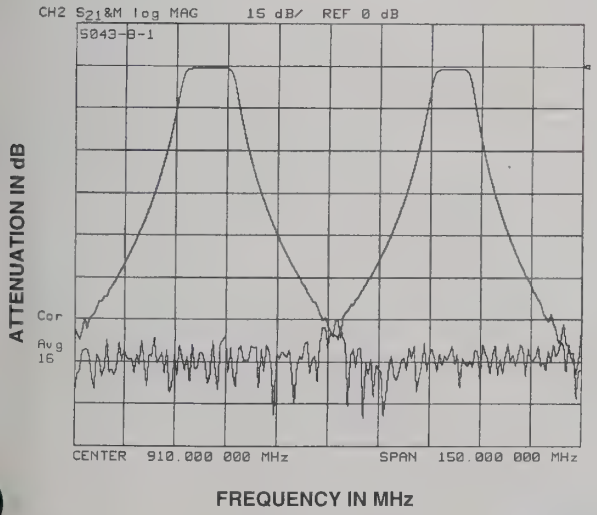
This duplexer is well suited for full bandwidth coverage in cellular or trunking operations for either European or North American frequencies. The unit is capable of handling 600 Watts, may be mounted to occupy only four vertical rack spaces including the antenna connector panel and can be engineered to accommodate special response requirements. Contact our Customer Service Department for special requirements.

- **Low loss** — Maximizes system performance.
- **High isolation** — Minimizes interference.
- **Temperature compensated** — Ensures consistent performance across temperature and power range.

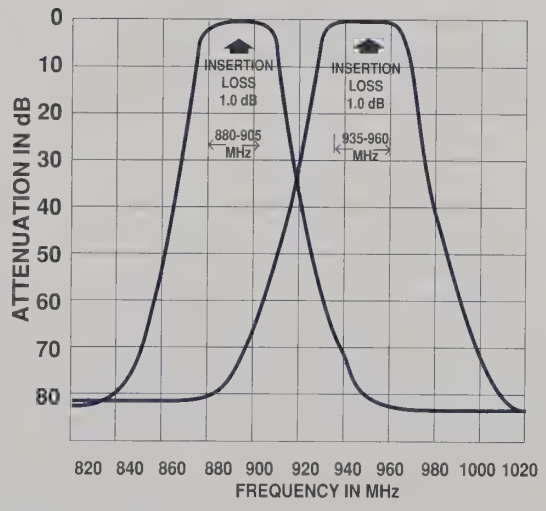
WHEN ORDERING:
Provide transmit frequency, receive frequency. Check Tx/Rx spacing (per catalog specified minimum spacing).

PD5043

PD5043-8 RESPONSE CURVE (Typical)
45 MHz SPACING
(816-821 MHz) (861-866 MHz)
TRUNKING BAND



PD5043-8 RESPONSE CURVE (Typical)
55 MHz SPACING
(880-905 MHz) (935-960 MHz)
EUROPEAN CELLULAR BAND



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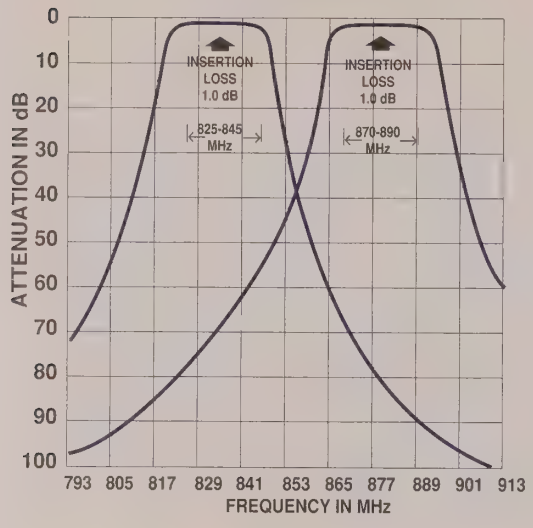
High Selectivity, High Power Band Pass Duplexer

PD5043-8 RESPONSE CURVE (Typical)
45 MHz SPACING
(825-845 MHz) (870-890 MHz)
CELLULAR BAND



ELECTRICAL SPECIFICATIONS	PD5043-8	PD5043-8	PD5043-8
Frequency Range - MHz	816-821 Rx 861-866 Tx	825-845 Rx 870-890 Tx	880-905 Rx 935-960 Tx
Frequency Spacing - MHz	45	45	55
Continuous Power Input - Watts	400*	600*	600*
Insertion Loss Tx-Ant. - dB	1.5	1.0	1.0
Insertion Loss Rx-Ant. - dB	1.5	1.0	1.0
Tx Noise Supression at Rx Frequency - dB	90	60	60
Rx Isolation at Tx Frequency - dB	90	60	60
Maximum VSWR (50 Ohms)	1.3:1	1.3:1	1.3:1
Impedence - Ohms	50	50	50
Connector	N-female	N-female	N-female
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)		

*At 10 MHz or greater bandwidth

MECHANICAL SPECIFICATIONS	PD5043-8 Vertical Mounting	PD5043-8 Back-to-Back Mounting
Height - in. (mm)	10-5/8 (270)	7 (178)
Width - in. (mm)	19 (483)	19 (483)
Length - in. (mm)	10 (254)	18-7/8 (479)
Weight - lbs. (kg)	26-1/2 (12)	26-1/2 (12)

Mounts in standard 19 in. (483) E.I.A. Rack Panel.

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Expanded Spectrum Duplexers

PD5188-14 **Wireline**
PD5188-25 **Non-wireline**

These specially designed E AMPS Cellular duplexers are available for either wireline (PD5188-14) or non-wireline (PD5188-25) applications. Both allow the system operator to reduce the number of antennas needed at the cell site with only 1.0 dB insertion loss. These compact, broadband duplexers are ideal where space is limited and operate continuously up to 500 Watts.

- **Low loss** — Minimizes Rx noise, maximizes Tx ERP.
- **Reduced site requirements** — Less antenna and component space required.
- **High power capability** — Operates up to 20, 45 Watt transmitters.

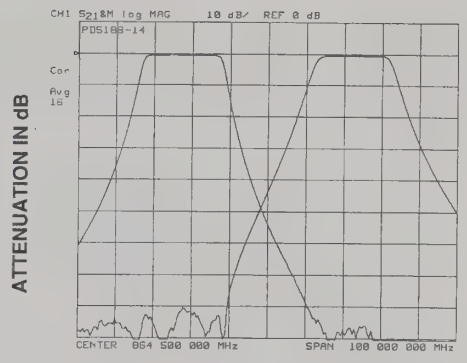
PD5188-25

ELECTRICAL SPECIFICATIONS	PD5188-14	PD5188-25
Frequency Range - MHz	824-894	824-894
Frequency Spacing - MHz	14	25
Bandwidth - Tx Rx	(880-894) (835-849)	(869-894) (824-849)
Insertion Loss - max. dB	1.0	1.0
Transmit Noise Suppression	@ 849 MHz > 75 dB	@ 849 MHz > 60 dB
Receiver Isolation	@ 880 MHz > 75 dB	@ 869 MHz > 60 dB
Impedance - Ohms	50	50
VSWR max.	1.5:1	1.5:1
Power - Watts	500	500
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)

MECANICAL SPECIFICATIONS		
Connectors -Tx, Rx, Ant. Coupling Probe	N-female BNC-female	N-female BNC-female
Dimensions - in. (mm) H x W x D	3-1/2 x 19 x 12 (89 x 483 x 305)	3-1/2 x 19 x 12 (89 x 483 x 305)
Weight - lbs. (kg)	14 (6.3)	14-3/4 (6.6)

Mounts in standard 19 in. (483 mm) E.I.A. rack panel.

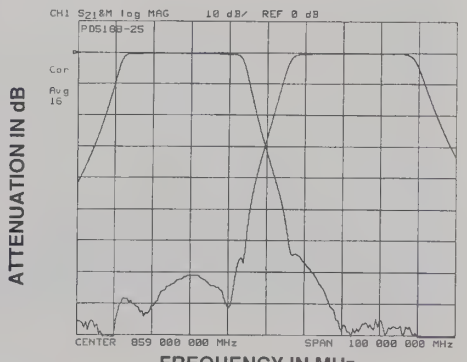
PD5188-14 RESPONSE CURVE



ATTENUATION IN dB

FREQUENCY IN MHz

PD5188-25 RESPONSE CURVE



ATTENUATION IN dB

FREQUENCY IN MHz

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

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Telemetry Duplexers

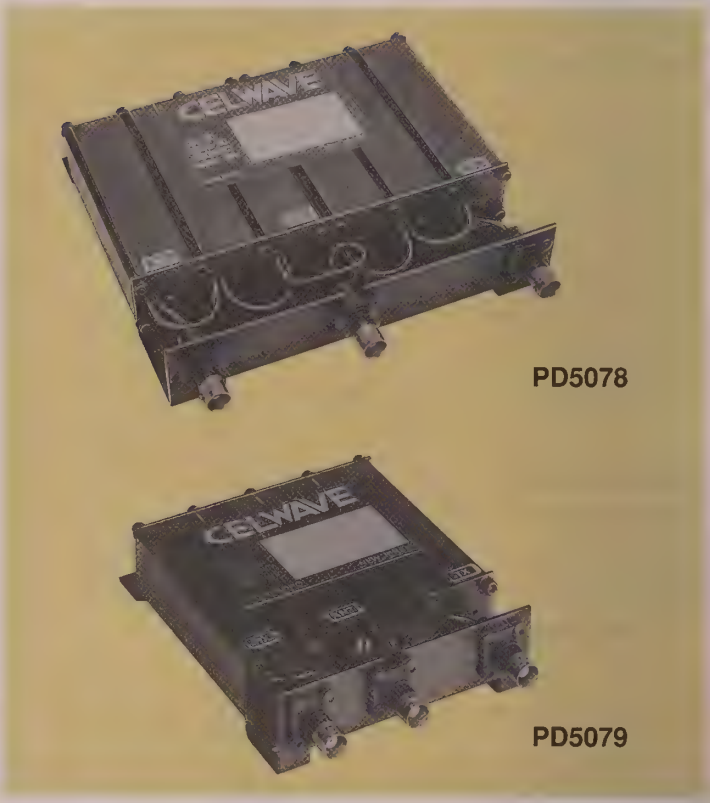
PD5078* **6 Cavity**
PD5079* **4 Cavity**

***Exact Tx and Rx frequencies must be specified.**

These Celwave duplexers have been engineered specifically for telemetry system applications. Of four and six cavity design, each features different levels of isolation and outer dimension configuration. These compact, durable duplexers utilize solid shielded copper jacketed intercabling for low loss and are temperature compensated from ⁻22°F to ⁺140°F.

- **High isolation** — Minimizes interference.
- **Low loss** — Maximizes system performance.
- **Temperature compensated** — Ensures consistent performance across temperature range.

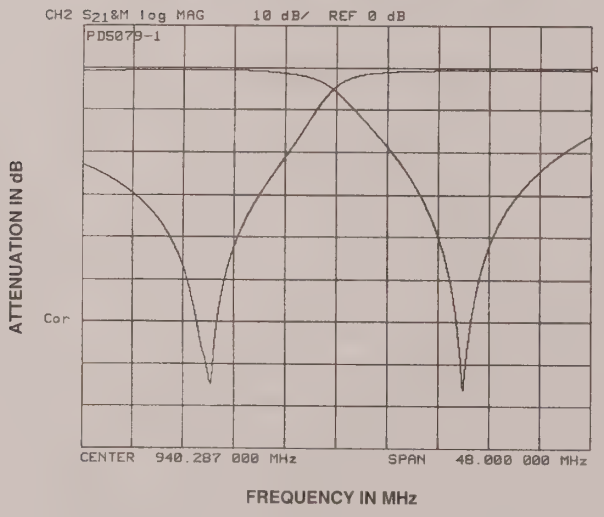
WHEN ORDERING:
Provide transmit frequency, receive frequency. Check Tx/Rx spacing (per catalog specified minimum spacing).



PD5078

PD5079

PD5079
RESPONSE CURVE (Typical)
48 MHz SPACING (896-960 MHz)



ELECTRICAL SPECIFICATIONS	PD5079 (4 CAVITY)	PD5078 (6 CAVITY)
Frequency Range - MHz	896-960	896-960
Frequency Spacing - MHz	24	24
Continuous Power Input - Watts	50	50
Insertion Loss, Tx - Ant. - dB	1.0	1.0
Insertion Loss, Rx - Ant. - dB	1.0	1.0
Tx Noise Suppression at Rx Frequency - dB	60	80
Rx Isolation at Tx Frequency - dB	60	80
VSWR - Max.	1.5:1	1.5:1
Connector	BNC female	BNC female
Temperature Range - °F (°C)	⁻22 to ⁺140 (⁻30 to ⁺60)	

MECHANICAL SPECIFICATIONS	PD5079 (4 CAVITY)	PD5078 (6 CAVITY)
Height - in. (mm)	1-1/4 (32)	1-1/4 (32)
Width - in. (mm)	4-1/8 (105)	6-1/4 (159)
Length - in. (mm)	6-1/4 (159)	6 (152)
Weight - lbs. (kg)	1.25 (.6)	1.75 (.8)

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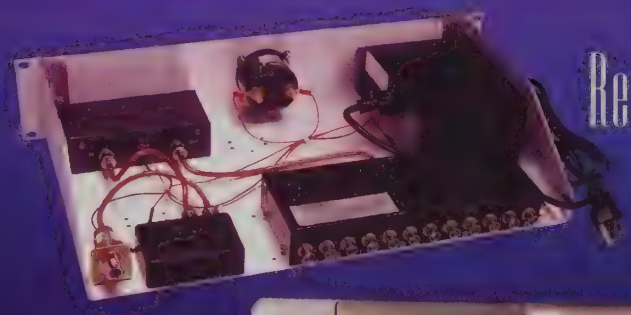
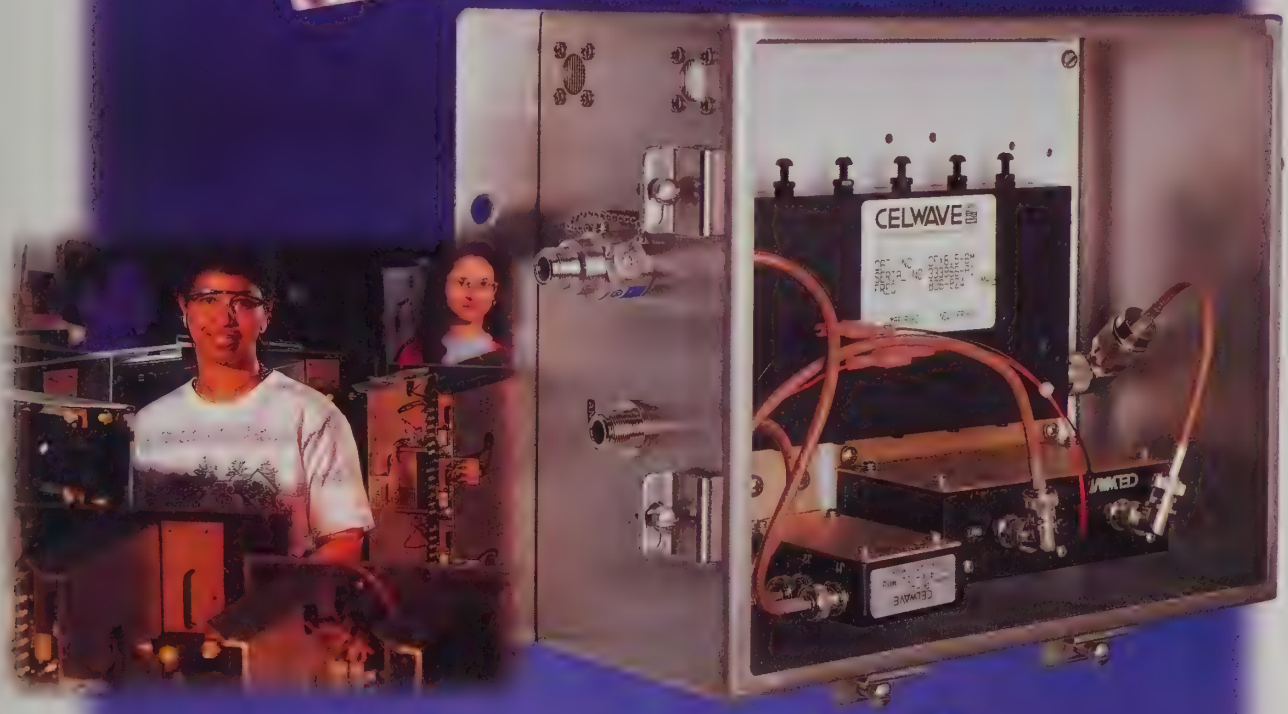
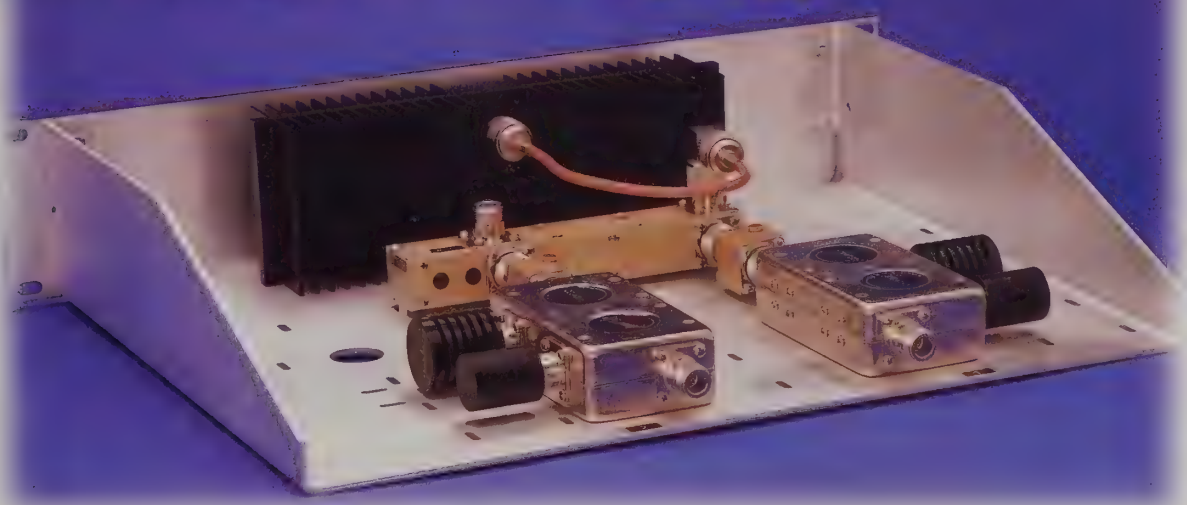
Receiver Multicouplers







Receiver Multicouplers

THE FOLLOWING INFORMATION IS REQUIRED WHEN PLACING AN ORDER:

RECEIVER MULTICOUPLER..

Beginning & End frequency
Check bandwidth constraints
Number of channels, must not exceed the number of RMC ports. Specify power source (12VDC, 24VDC, 120VAC, 220VAC)

TO PLACE AN ORDER:

IN NORTH AMERICA, MEXICO:

Tel: 1-800/321-4700 Fax: 1-615/641-1910

INTERNATIONAL:

Tel: 1-908/462-1880 Fax: 1-908/431-8388

TECHNICAL SUPPORT:

Tel: 800/659-1880 Fax: 1-908/462-6919

OR CALL...1-800/CELWAVE

Receiver Multicouplers

RMC070 Series*	66-88 MHz
RMC150 Series*	136-174 MHz
RMC406 Series*	406-450 MHz
RMC460 Series*	450-512 MHz

***Exact frequencies and power source must be specified.**

Designed for use in the most demanding environments, this Celwave series couples several receivers to a single antenna. They each feature a low noise amplifier with outstanding immunity to intermodulation and come complete with power supply, amplifier and compact preselector filter.

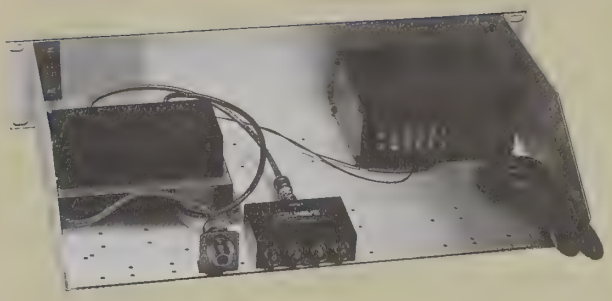
These receiver multicoupler packages are easily field expandable in increments of four channels in a matter of minutes using only a Phillips head screwdriver. When expanded in excess of 32 channels, two rack trays requiring a total of seven inches vertical rack space are used for mounting.

Standard power supplies accommodate 120 VAC, 240 VAC, 60 Hz, 50 Hz, 12 VDC or 28 VDC sources. Optional power supplies for other sources are available. Please specify power requirements when ordering. Customized preselector configurations should be discussed with our Customer Service Department. Tower mounted amplifier packages are available for RMC406 and RMC460 Series.

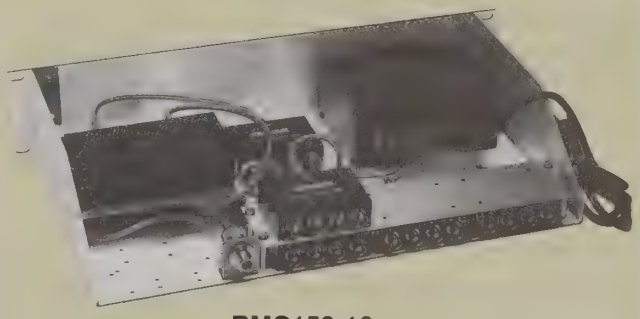
It is recommended that unused divider ports be terminated with an AL001 load resistor.

- **Modular** — Easily expandable in the field.
- **Compact** — Minimizes rack space requirements.

WHEN ORDERING:
Provide beginning and end frequency and check bandwidth constraints. Number of channels must not exceed the number of RMC ports. Specify power source (12VDC, 24 VDC, 120 VC, 220 VAC).



RMC150-4



RMC150-16

Ordering Information: To order an RMC specify—

RMC460-4(24V)

1. Frequency	2. No. of Ports 4 to 64	3. Power Source- 12 VDC 24 VDC (24-28) 120 VAC 220 VAC (220-240)

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Receiver Multicouplers

RMC070 SERIES

ELECTRICAL SPECIFICATIONS	RMC070-4*	RMC070-8*	RMC070-12*	RMC070-16*
Frequency Range - MHz**	66-88	66-88	66-88	66-88
Bandwidth, Standard Available - MHz	1.0	1.0	1.0	1.0
Isolation - dB Between Ports	25 typical	25 typical	25 typical	25 typical
Noise Figure, Total Including Filter - dB	7.9	7.9	7.9	7.9
3rd Order Intercept Point - dBm	35	35	35	35
System Gain, Min. - dB	1.0	-0.5	-0.5	-0.5
Power Required	120 VAC, 240 VAC, 50 Hz, 60 Hz, 12 VDC, 28 VDC, Maximum Power Consumption 3.0W			

MECHANICAL SPECIFICATIONS	RMC070-4	RMC070-8	RMC070-12	RMC070-16
Dimensions - in. (mm)	Supplied on 19 (483) Rack Tray, 3-1/2 (89) High, 10 (254) Deep			
Connector - Ant. Input	N-female	N-female	N-female	N-female
Connector - Rx Outputs	BNC female	BNC female	BNC female	BNC female
Weight - lbs. (kg)	9.3 (4.2)	10.2 (4.6)	10.7 (4.9)	11.2 (5.1)

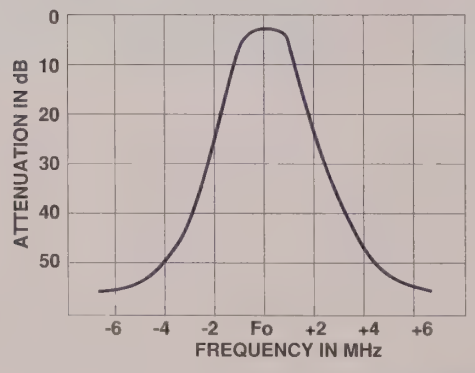
RMC150 SERIES

ELECTRICAL SPECIFICATIONS	RMC150-4*	RMC150-8*	RMC150-12*	RMC150-16*
Frequency Range - MHz**	136-174	136-174	136-174	136-174
Bandwidth, Standard Available - MHz†	1.5	1.5	1.5	1.5
Isolation - dB Between Ports	25 typical	25 typical	25 typical	25 typical
Noise Figure, Total Including Filter - dB	7.7	7.7	7.7	7.7
3rd Order Intercept Point - dBm	35	35	35	35
System Gain, Min. - dB	1.0	-0.5	-0.5	-0.5
Power Required	120 VAC, 240 VAC, 50 Hz, 60 Hz, 12 VDC, 28 VDC, Maximum Power Consumption 3.0W			

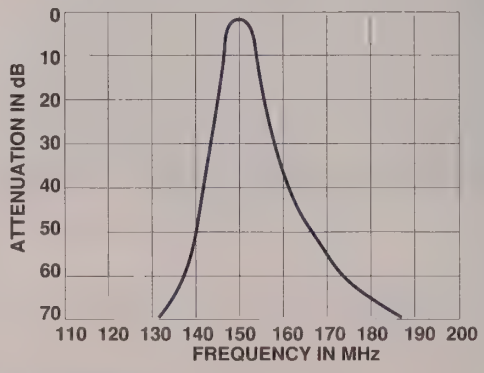
MECHANICAL SPECIFICATIONS	RMC150-4	RMC150-8	RMC150-12	RMC150-16
Dimensions - in. (mm)	Supplied on 19 (483) Rack Tray, 3-1/2 (89) High, 10 (254) Deep			
Connector - Ant. Input	N-female	N-female	N-female	N-female
Connector - Rx Outputs	BNC female	BNC female	BNC female	BNC female
Weight - lbs. (kg)	8.4 (3.8)	9.3 (4.2)	9.8 (4.5)	10.3 (4.7)

*Field expandable for up to 64 outputs in increments of four.
**Exact frequencies must be specified.
† Other bandwidths are avalable up to 8 MHz, contact Customer Service.

RMC070 SERIES
INPUT FILTER RESPONSE CURVE (Typical)



RMC150 SERIES
INPUT FILTER RESPONSE CURVE (Typical)



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Receiver Multicouplers

RMC406 SERIES

ELECTRICAL SPECIFICATIONS	RMC406-4*	RMC406-8*	RMC406-12*	RMC406-16*
Frequency Range - MHz	406-450	406-450	406-450	406-450
Bandwidth, Standard Available - MHz	6	6	6	6
Isolation - dB Between Ports	25 typical	25 typical	25 typical	25 typical
Noise Figure, Total Including Filter - dB	5.5	5.5	5.5	5.5
3rd Order Intercept Point - dBm	+36	+36	+36	+36
System Gain, Min. - dB	2	1	1	1
Power Required	120 VAC, 240 VAC, 50 Hz, 60 Hz, 12 VDC, 28 VDC, Maximum Power Consumption 6W			

MECHANICAL SPECIFICATIONS	RMC406-4	RMC406-8	RMC406-12	RMC406-16
Dimensions - in. (mm)	Supplied on 19 (483) Rack Tray, 3-1/2 (89) High, 10 (254) Deep			
Connector - Ant. Input	N-female	N-female	N-female	N-female
Connector - Rx Outputs	BNC female	BNC female	BNC female	BNC female
Weight - lbs. (kg)	8.4 (3.8)	9.3 (4.2)	9.8 (4.5)	10.3 (4.7)

*Field expandable for up to 64 outputs in increments of four.

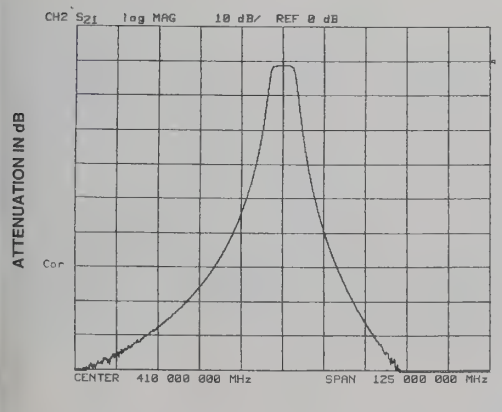
RMC460 SERIES

ELECTRICAL SPECIFICATIONS	RMC460-4*	RMC460-8*	RMC460-12*	RMC460-16*
Frequency Range - MHz	450-512	450-512	450-512	450-512
Bandwidth, Standard Available - MHz	6	6	6	6
Isolation - dB Between Ports	25 typical	25 typical	25 typical	25 typical
Noise Figure, Total Including Filter - dB	5.5	5.5	5.5	5.5
3rd Order Intercept Point - dBm	+36	+36	+36	+36
System Gain, Min. - dB	2	1	1	1
Power Required	120 VAC, 240 VAC, 50 Hz, 60 Hz, 12 VDC, 28 VDC, Maximum Power Consumption 6W			

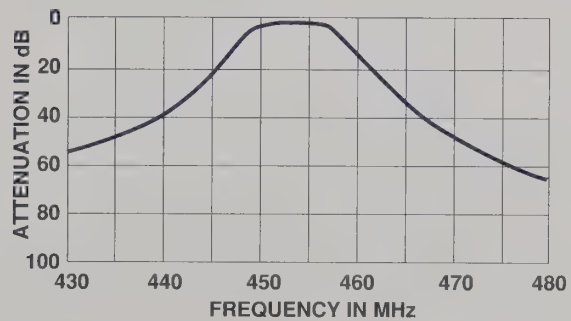
MECHANICAL SPECIFICATIONS	RMC460-4	RMC460-8	RMC460-12	RMC460-16
Dimensions - in. (mm)	Supplied on 19 (483) Rack Tray, 3-1/2 (89) High, 10 (254) Deep			
Connector - Ant. Input	N-female	N-female	N-female	N-female
Connector - Rx Outputs	BNC female	BNC female	BNC female	BNC female
Weight - lbs. (kg)	8.4 (3.8)	9.3 (4.2)	9.8 (4.5)	10.3 (4.7)

*Field expandable for up to 64 outputs in increments of four.

RMC406 SERIES
INPUT FILTER RESPONSE CURVE
(Typical)



RMC460 SERIES
INPUT FILTER RESPONSE CURVE
(Typical)



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Cellular Receiver Multicouplers

RMC836-32N24V	**Non-Wireline, 6-pole**
RMC836-32N24V-8	**Non-Wireline, 8-pole**
RMC842-32W24V	**Wireline, 6-pole**
RMC842-32W24V-8	**Wireline, 8-pole**

This series of high performance receiver multicouplers has been specially designed for expanded spectrum cellular systems. They are ideal for use where transmission runs do not exceed 300 feet. They can also be used with other Celwave preselector filters for increased selectivity and to minimize interference from adjacent cellular, high power SMR or dedicated channel users. Our 32 channel unit is the most widely used but 4 to 64 channel versions are available.

All 6 and 8-pole wireline and non-wireline models feature 6 and 8-pole preselector filters respectively. Eight pole versions provide improved system performance and greater selectivity. The front panels of all units have a fuse and LED display to indicate on/off status. It is recommended that all unused divider ports be terminated with an AL001 one Watt termination.

- **Low noise** — Improves system/carrier interference levels.
- **Wireline or non-wireline** — Minimizes interference from adjacent carriers.
- **High performance amplifiers** — Assures better system reliability.
- **High gain** — Improves better system reception.
- **Small size** — Minimizes space requirements.

PD5200 Receiver Distribution Tray

Facilitates the cabling of receivers with individual equipment racks. The tray can accomodate up to 16 receivers with only 1-3/4 inches of vertical rack space.

RMC836-32

PD5200

Ordering Information:
To order a Cellular Receiver Multicoupler specify—

RMC842-32W 24V-8

1. Frequency (center)
842 MHz - Wireline
836 MHz - Non-Wireline

2. No. of Ports - 12, 24 or 32

3. Band
W - Wireline
N - Non-Wireline

4.Power Source
28 VDC

5. No Poles (Filter)
Blank - 6 Pole
8 - 8 Pole

Note: These Receiver Multicouplers are painted brown. Black paint is a no cost option.

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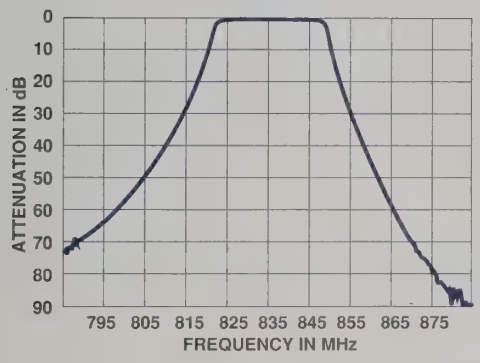
Cellular Receiver Multicouplers

ELECTRICAL SPECIFICATIONS	RMC836-32N24V	RMC836-32N24V-8	RMC842-32W24V	RMC842-32W24V-8
Frequency Range - MHz	824-846.5	824-846.5	835-849	835-849
Bandwidth - MHz	22.5	22.5	14	14
Noise Figure-Total Including Filter - dB	4.5	4.8	4.5	4.7
3rd Order Intercept Point - dBm	+34	+34	+34	+34
System Gain Max. - dB**	10	10	10	10
Power Required - VDC (Maximum Power Consumption 6W)	28	28	28	28

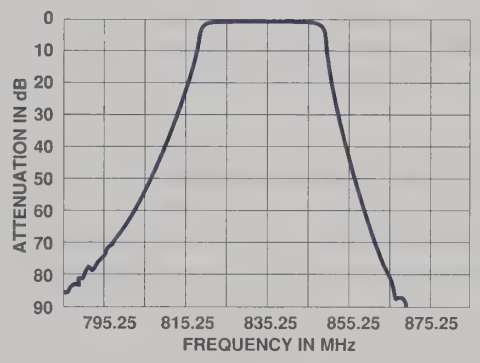
**6 dB Attenuator Removed

MECHANICAL SPECIFICATIONS	RMC836-32N2AV	RMC836-32N24V-8	RMC842-32W24V	RMC842-32W24V-8
Dimensions - in. (mm)	Supplied on 19 in. (483 mm) EIA Rack Tray 3-1/2 in. (89 mm) High, 12 in. (254 mm) Deep			
Connector - Ant. Input	N-female	N-female	N-female	N-female
Connector - Rx Output	BNC female	BNC female	BNC female	BNC female
Weight - lbs. (kg)	12.2 (5.5)	12.7 (5.72)	12.2 (5.5)	12.7 (5.72)

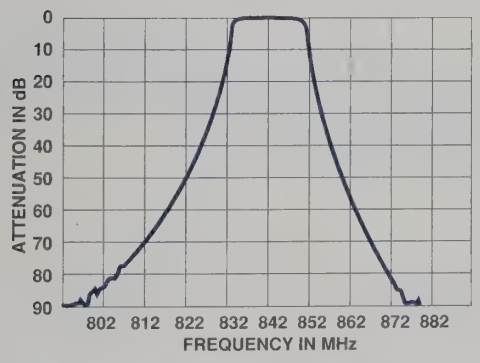
RMC836-6N
INPUT FILTER RESPONSE CURVE



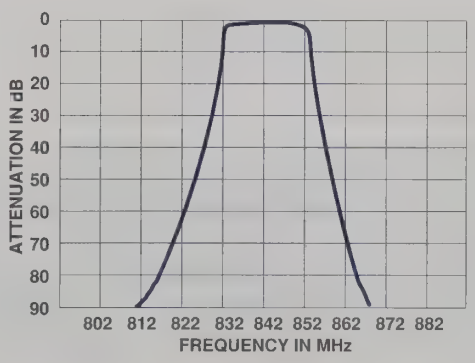
RMC836-8N
INPUT FILTER RESPONSE CURVE



RMC842-6
INPUT FILTER RESPONSE CURVE



RMC842-8
INPUT FILTER RESPONSE CURVE



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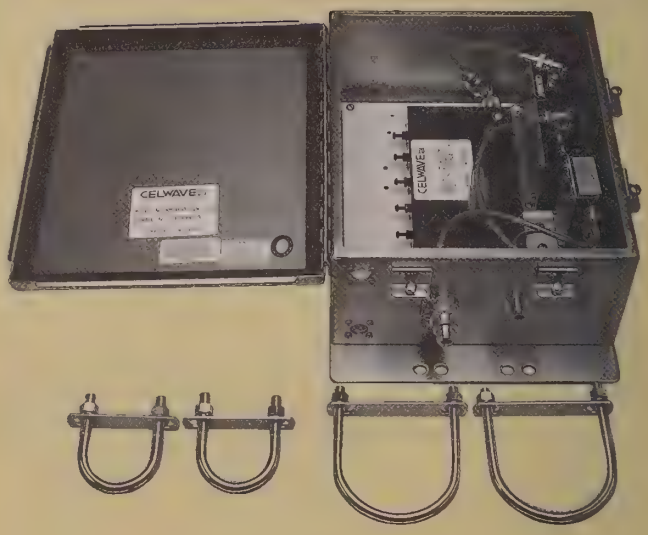
Tower Mounted Cellular Receiver Multicouplers

RMC836-16K*
RMC842-16K*
***Exact frequencies must be specified.**

These tower top receiver multicouplers are designed for both wide area MSA and RSA applications. They are ideal for transmission line runs in excess of 300 feet and provide exceptional balance between "talkback" and "talkout" so essential to wide area coverage. All of Celwave's tower top receiver multicouplers contain a high dynamic range redundant amplifier in the tower box and single stage amplifier in the base unit. Both low noise, high gain amplifiers are protected by a high current Zener diode and other forms of field proven transient protection to minimize failure due to lightning strikes. Available in 8 to 64 channel capacity.

- **Low noise** — Improves system carrier/interference level.
- **High gain** — Improves total system reception.
- **Wireline or non-wireline preselector** — Reduces interference in areas where two carriers are located.
- **Redundant amplifiers** — Assures better overall system reliability.
- **Lightning protected** — Dependable system operation.

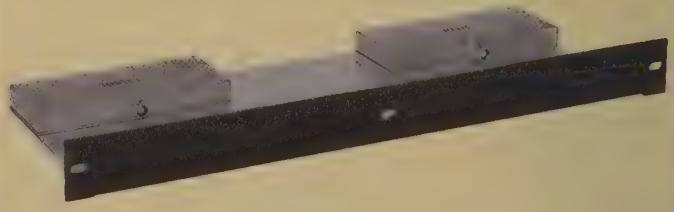
RMC842-12K



Tower Box

PD5200 Receiver Distribution Tray

Facilitates the cabling of receivers with individual equipment racks. The tray can accomodate up to 16 receivers with only 1-3/4 inches of vertical rack space.



PD5200

WHEN ORDERING:
Provide beginning and end frequency and check bandwidth constraints. Number of channels must not exceed the number of RMC ports. Specify power source (12VDC, 24 VDC, 120 VC, 220 VAC).

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Tower Mounted Cellular Receiver Multicouplers

ELECTRICAL SPECIFICATIONS	RMC836-16K	RMC836C-16K	RMC842-16K
Frequency Range - MHz	824-846.5	824-849	835-849
Bandwidth - MHz	22.5	25	14
Noise Figure, Total Including Filter - dB	4.8	4.8	4.8
3rd Order Intercept Point - dBm	+34	+34	+34
Amplifier Gain (Tower Box) - dB	26.5	26.5	26.5
Amplifier Gain (Base Tray) - dB	19.5	19.5	19.5
System Gain, Excluding Cable Loss - dB Min.*	23.4	23.1	23.6
Amplifier Network	Dual Stage, Redundant Tower		
Power Required	120, or 220 VAC, 50 Hz, 60 Hz or 28 VDC; Max. Power Consumption 15W		

MECHANICAL SPECIFICATIONS		RMC836-16K	RMC836C-16K	RMC842-16K
Dimensions - in. (mm) W x H x D	Tower Box		10 x 12 x 5 (254 x 304.8 x 127)	
	Base Tray		19 x 3-1/2 x 10 (483 x 89 x 254)	
Connectors (Tower Box)	Input	N-female	N-female	N-female
	Output	N-female	N-female	N-female
Connectors (Base Tray)	Input	N-female	N-female	N-female
	Output	BNC female	BNC female	BNC female
Weight - lbs. (kg)	Tower Box	16 (7.2)	16 (7.2)	16 (7.2)
	Base Tray	19 (8.55)	19 (8.55)	19 (8.55)

Ordering Information: To order a Tower Top RMC specify—

RMC836-16K (24V)

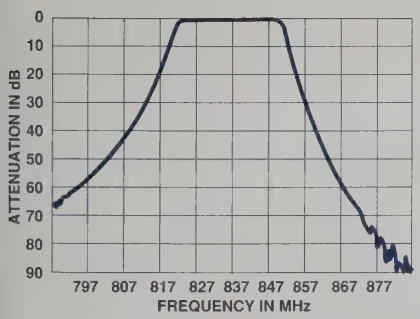
1. Frequency (Center)
842 MHz - Wireline
836 MHz - Non-Wireline

2. No. of ports - Specify 8 to 64

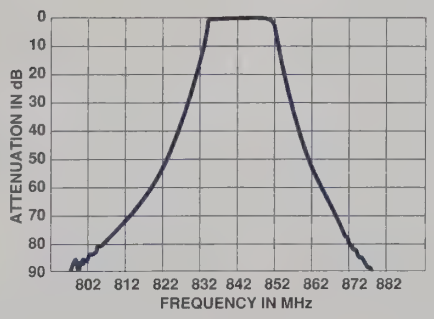
3. A for single stage; K for dual stage

4. Power Source-
12 VDC
24 VDC (24-28)
120 VAC
220 VAC (220-240)

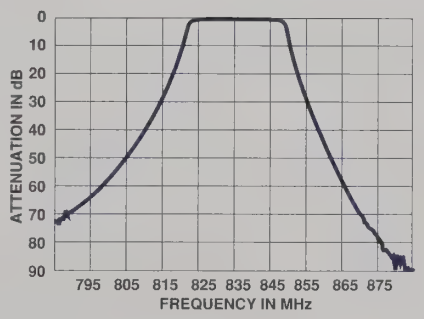
RMC836-16K INPUT FILTER RESPONSE CURVE



RMC842-16K INPUT FILTER RESPONSE CURVE



RMC836C-16K INPUT FILTER RESPONSE CURVE



CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

Tower Mounted Receiver Multicouplers

RMC800-12A*, 24A*
RMC800-12K*, 24K*
RMC900-10K*, 20K*
*** Exact frequencies must be specified.**

These Celwave units are receiver multicouplers used in trunking systems requiring the ultimate in 800/900 MHz performance.

All of the Celwave tower mounted multicouplers consist of a base mounted unit which contains a power supply with a high dynamic range amplifier and power dividers which distribute the signals to the receivers. A separate tower mounted weather resistant enclosure houses a high selectivity input filter coupled to a low-noise, high dynamic range amplifier. These multicoupler systems include the latest in field-proven transient protection to minimize failure due to lightning. Each amplifier is protected by a high-current Zener diode. The power for the top amplifier is coupled to the transmission line with DC block devices which incorporate two metal oxide varistors and a high pass filter to suppress the AC components of a surge. Gas tube impulse suppressors are installed in the tower mounted enclosure where the transmission line enters and an additional impulse suppressor is supplied to be mounted where the transmission line enters the station. Finally, surge suppressors protect both sides of the AC line input.

The RMC800-12A and RMC800-24A are designed for 12 or 24 outputs respectively. A single stage, low noise tower mounted amplifier provides net system gains useful in many installations where the transmission line loss is 5 dB or less.

The RMC800-12K, RMC800-24K, RMC900-10K and RMC900-20K are designed for 12, 24, 10 or 20 outputs. A dual stage, low noise, high gain tower mounted amplifier is hybrid coupled, greatly reducing the possibility of down time due to device failure.

A 500 mA meter mounted on the station chassis indicates the current drain of the tower mounted amplifier, providing a good indication of its proper operation.

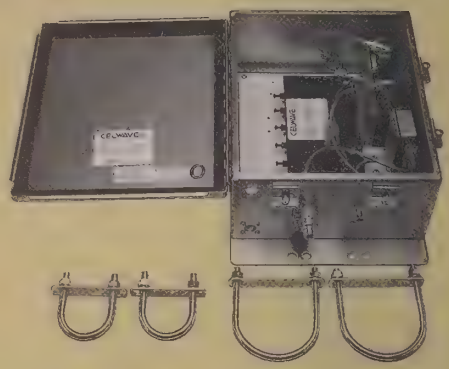
All models are available with optional switching that allows selection of a main or back-up amplifier in the tower box.

Note: 500 mA meter standard with 12K and 24K units only.

RMC800-24K (Front View)

RMC800-24K (Back View)

RMC800-12K



Tower Box

Models RMC800-24K and RMC-12K are listed by Underwriters Laboratories Inc.

• **Low loss**	Maximizes receiver sensitivity.
• **Weather resistant enclosure**	Ensures system reliability in hostile environments.
• **Built-in surge protection**	Minimizes failure due to lightning.
• **Low noise ratio**	Maximizes system performance.

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Tower Mounted Receiver Multicouplers

ELECTRICAL SPECIFICATIONS	RMC800-12A	RMC800-24A	RMC800-12K	RMC800-24K	RMC900-10K*	RMC900-20K
Frequency Range - MHz	806-824	806-824	806-824	806-824	890-915	890-915
Bandwidth, Standard Available - MHz	18	18	18	18	6	6
System Noise Figure Excluding Cable Loss - dB	5.5	5.5	4.5	4.5	4.5	4.5
3rd Order Intercept Point - dBm	+34	+34	+34	+34	34.5	34.5
Amplifier Gain (Tower Box) - dB	14	14	26.5	26.5	26.5	26.5
Amplifier Gain (Base Tray) - dB	19.5	19.5	19.5	19.5	19.5	19.5
System Gain, Excluding Cable Loss - dB**	17.9	14.2	30.4	26.7	31.2	27.5
Amplifier Networks	Single Stage, Tower and Base		Dual Stage, Redundant Tower		Dual Stage, Redundant Tower	
Power Required (Specify on Order)	120 Vac or 240 Vac, 50 Hz, 60 Hz or 28 VDC; Maximum Power Consumption 15W					

*Field expandable up to 20 outputs in increments of ten.
**3 dB Attenuator removed.

MECHANICAL SPECIFICATIONS	RMC800-12A	RMC800-24A	RMC800-12K	RMC800-24K	RMC900-10K	RMC900-20K
Dimensions - in. (mm) W x H x D	Tower Box: 10 x 12 x 5 (254 x 305 x 127) E.I.A. Rack Tray: 19 x 3-1/2 x 10 (483 x 89 x 254)					
Connectors (Tower Box)	Input: N-female Output: N-female					
Connectors (Base Tray)	Input: N-female Output: BNC female					
Weight of Tower Box - lbs. (kg)	19 (8.6)	19 (8.6)	19 (8.6)	19 (8.6)	19 (8.6)	19 (8.6)
Weight Base Tray - lbs. (kg)	8.5 (3.8)	10.5 (4.8)	9.3 (4.2)	11.7 (5.3)	9.1 (4.1)	11.7 (5.2)

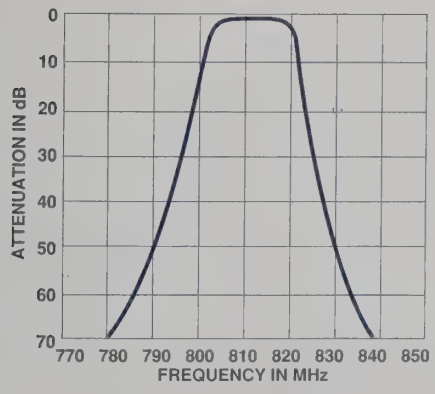
Ordering Information: To order a Tower Top RMC specify—

RMC800-12A (24V)

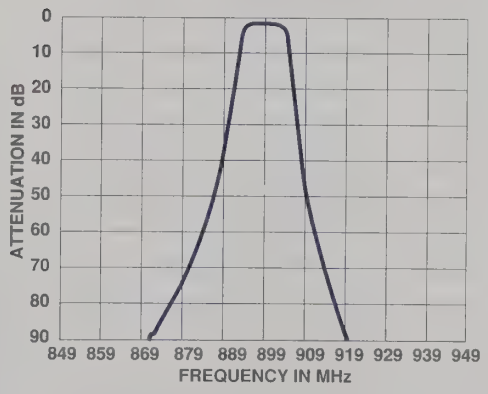
1. Frequency
3. A for single stage; K for dual stage
4. Power Source-
   12 VDC
   24 VDC (24-28)
   120 VAC
   220 VAC (220-240)

2. No. of ports-12, 24 for 800 MHz models; 8 for 842 MHz models; 10, 20 for 900 MHz models

RMC800 SERIES (Typical)
INPUT FILTER RESPONSE CURVE



RMC900 SERIES (Typical)
INPUT FILTER RESPONSE CURVE



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Receiver Multicouplers

RMC800 Series* **4 to 64 Channel**
RMC900 Series*
***Exact frequencies and power source must be specified.**

These Celwave units feature low noise amplifiers with outstanding immunity to intermodulation and come complete with power supply, amplifier and compact preselector filter. They are designed for use in the most demanding environments and can combine multiple receivers to a single antenna. The RMC900 Series was specially developed to prevent interference from cellular transmit bands at co-located sites.

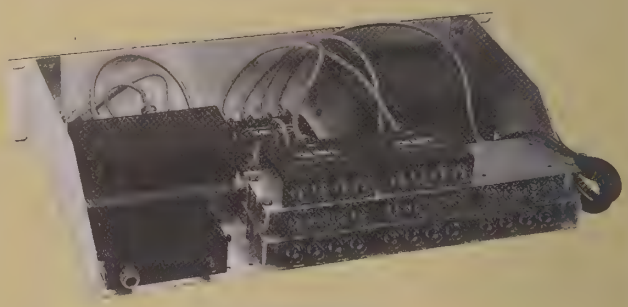
Non-Expandable Models
The RMC800-4N and RMC800-8N are four and eight output models offering economical solutions for systems with a limited number of channels.

Expandable Models
The RMC800 series are easily expanded in the field to up to 64 outputs using nothing but a screwdriver. Expansion kits are available and include power divider, cable assembly and all necessary hardware. A 6 dB attenuator pad is included between amplifier stages and can be readily removed should increased gain be required. Optional amplifiers are available to meet special requirements. *Expansion Kits and amplifiers are listed on page 233 and 234.*

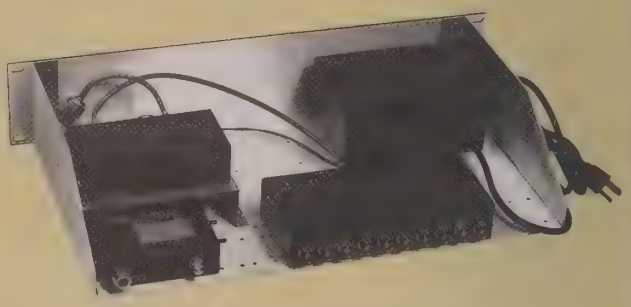
Standard power supplies accommodate 120 VAC, 240 VAC, 60 Hz, 50 Hz, 12 VDC or 28 VDC. Optional power supplies for other sources are available. Please specify power requirements when ordering. It is recommended that all unused ports be terminated with an AL001 one Watt load termination. Celwave will not guarantee system specifications if unused ports are not terminated.

- **High selectivity low noise** — Maximizes system performance.
- **Modular** — Easily expandable in the field.
- **Compact** — Minimizes rack space requirements.

RMC800-8



RMC800-32



RMC900-10

Ordering Information: To order an RMC specify—

Expandable Models

RMC800-4(24V)

1. Frequency
2. No Ports 4 to 64
3. Power Source-
   12 VDC
   24 VDC (24-28)
   120 VAC
   220 VAC (220-240)

Non Expandable Models
Available for 4 and 8 port models only. Specify RMC800-4N or RMC800-8N.

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Receiver Multicouplers

RMC800 SERIES

ELECTRICAL SPECIFICATIONS	RMC800-4N	RMC800-8N
Frequency Range - MHz***	806-824	806-824
Bandwidth, Standard Available - MHz	18	18
Noise Figure, Total Including Filter - dB	4.0	4.0
3rd Order Intercept Point - dBm	+30	+30
System Gain, Min. - dB	5	2
Power Required	120 VAC, 240 VAC, 50 Hz, 60 Hz, 28 VDC; Maximum Power Consumption 1W	

***Exact frequencies must be specified.

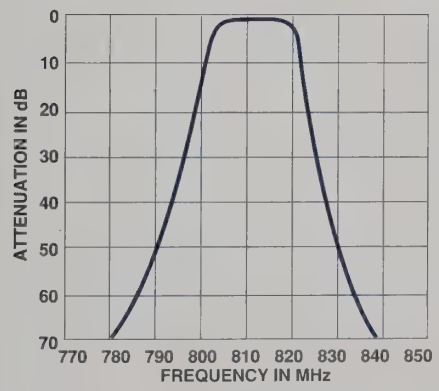
MECHANICAL SPECIFICATIONS	RMC800-4N	RMC800-8N
Dimensions - in. (mm)	Supplied on 19 (483) E.I.A. Rack Tray 3-1/2 (89) High, 10 (254) Deep	
Connector - Ant. Input	N-female	N-female
Connector - Rx Output	BNC female	BNC female
Weight - lbs. (kg)	8.2 (3.7)	9.2 (4.2)

ELECTRICAL SPECIFICATIONS	RMC800-4*	RMC800-8*	RMC800-12*	RMC800-16*	RMC800-20*
Frequency Range - MHz***	806-824	806-824	806-824	806-824	806-824
Bandwidth, Standard Available - MHz	18	18	18	18	18
Noise Figure, Total Including Filter - dB	4.5	4.5	4.5	4.5	4.5
3rd Order Intercept Point - dBm	+34	+34	+34	+34	+34
System Gain, Max. - dB**	12	12	12	12	10
Power Required	120 VAC, 240 VAC, 50 Hz, 60 Hz, 12 VDC, 28 VDC; Maximum Power Consumption 6W				

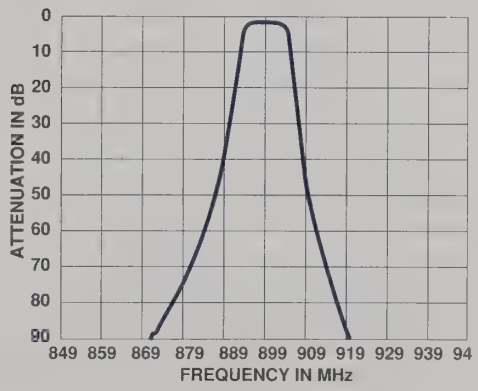
*Field expandable up to 64 outputs in increments of four.
**6 dB Attenuator removed.
***Exact frequencies must be specified.

MECHANICAL SPECIFICATIONS	RMC800-4	RMC800-8	RMC800-12	RMC800-16	RMC800-20
Dimensions - in. (mm)	Supplied on 19 (483) E.I.A. Rack Tray 3-1/2 (89) High, 10 (254) Deep				
Connector - Ant. Input	N-female	N-female	N-female	N-female	N-female
Connector - Rx Ouput	BNC female	BNC female	BNC female	BNC female	BNC female
Weight - lbs. (kg)	8.2 (3.7)	9.2 (4.2)	9.6 (4.4)	10.1 (4.6)	10.7 (4.9)

RMC800 SERIES (Typical)
INPUT FILTER RESPONSE CURVE



RMC900 SERIES (Typical)
INPUT FILTER RESPONSE CURVE



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Receiver Multicouplers

RMC800 SERIES

ELECTRICAL SPECIFICATIONS	RMC800-24*	RMC800-28*	RMC800-32*	RMC800-64
Frequency Range - MHz***	806-824	806-824	806-824	806-824
Bandwidth, Standard Available - MHz	15	15	15	15
Noise Figure, Total Including Fiter - dB	4.5	4.5	4.5	4.5
3rd Order Intercept Point - dBm	+34	+34	+34	+34
System Gain, Max. - dB**	10	10	10	7
Power Required	120 VAC, 240 VAC, 50 Hz, 60 Hz, 12 VDC, 28 VDC; Maximun Power Consumption 6W			

*Field expandable up to 64 outputs in increments of four.
**6 dB Attenuator removed.
***Exact frequencies must be specified.

MECHANICAL SPECIFICATIONS	RMC800-24	RMC800-28	RMC800-32	RMC800-64[1]
Dimensions[1] - in. (mm)	Supplied on 19 (483) E.I.A. Rack Tray 3-1/2 (89) High, 10 (254) Deep			
Connector - Ant. Input	N-female	N-female	N-female	N-female
Connector - Rx Ouput	BNC female	BNC female	BNC female	BNC female
Weight - lbs. (kg)	11.2 (5.1)	11.7 (5.3)	12.2 (5.5)	17.2 (7.8)

[1]64 Channel versions require two trays, total 7 inch vertical rack space.

RMC900 SERIES

ELECTRICAL SPECIFICATIONS	RMC900-10*	RMC900-20
Frequency Range - MHz***	890-915	890-915
Bandwidth, Standard Available - MHz	6	6
Noise Figure, Total Including Fiter - dB	4.9	4.9
3rd Order Intercept Point - dBm	+34	+34
System Gain - dB**	13	9.6
Power Required	110 VAC, 220 VAC, 50 Hz, 60 Hz, 28 VDC; Maximun Power Consumption 6W	

*Field expandable up to 64 outputs in increments of ten.
**3 dB Attenuator removed.
***Exact frequencies must be specified.

MECHANICAL SPECIFICATIONS	RMC900-10	RMC900-20
Dimensions - in. (mm)	Supplied on 19 (483) E.I.A. Rack Tray 3-1/2 (89) High, 10 (254) Deep	
Connector - Ant. Input	N-female	N-female
Connector - Rx Ouput	BNC female	BNC female
Weight - lbs. (kg)	8.5 (3.9)	11.1 (5.0)

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Receiver Multicoupler Expansion Kits and Replacement Parts

Amplifiers

PD656130 Single stage, high dynamic range amplifier which is a direct replacement for the unit used in the RMC070-4 through RMC070-16.

PD640000 Single stage, high dynamic range amplifier which is a direct replacement for the unit used in the RMC150-4 through RMC150-16.

PD656140 Single stage, high dynamic range amplifier which is a direct replacement for the unit used in the RMC460-4 through RMC460-16.

PD640060 Single stage, low noise, high dynamic range amplifier which is a direct replacement for the amplifier used in models RMC800-4N and RMC800-8N multicouplers; also a direct replacement for the tower mounted amplifier used in the RMC800-12A, RMC800-24A.

PD640080 Dual stage, low noise, high dynamic range amplifier replacement part for expandable series multicouplers RMC800-4 through RMC800-64.

PD640290 Dual stage, low noise, high dynamic range hybrid-coupled amplifier which is a direct replacement for tower mounted units used in the RMC800-12K and RMC800-24K.

PD640240 Single stage, high dynamic range amplifier which is a direct replacement for the station mounted unit used in the RMC800-12A, 12K and RMC800-24A, 24K.

Power Supplies

048210000 Replacement power supply for 120 VAC power source.

048187000 Replacement power supply for 240 VAC power source.

PD506270 Replacement power supply for 28 VDC power source.

PD506290 Special power supply to handle 120 VAC primary and 28 VDC backup (trickle charge) power sources.

Receiver Multicoupler Expansion Kits and Replacement Parts

Expansion Kits

All expansion kits are supplied complete with hardware and easy to follow instructions. The only tool required is a Phillips screwdriver. The instruction manuals which come with all multicouplers detail the expansion scheme. If further information is required, our Customer Service Department is ready to assist. The basic expansion kits follow:

Four-way power divider including interconnecting cable assembly and mounting hardware.

PD656520 20-512 MHz

PD656210 806-1000 MHz

Eight-way power divider including interconnecting cable assembly and mounting hardware.

PD656650 20-512 MHz

PD656220 806-1000 MHz

PD656270 Bracket assembly for mounting divider, includes bracket, spacers and mounting hardware.

Expansion Kit Table

	20-512 MHz	806-1000 MHz
To expand from 4 channels to 8 channels order part	PD656520 (2 required)	PD656210
To expand from 8 channels to 12 channels order part	PD656520	PD656210
To expand from 12 channels to 16 channels order part(s)	PD656520 & PD656270 (Bracket Assembly)	PD656210 & PD656270 (Bracket Assembly)

A second tray and two-way divider is required to expand beyond 32 channels. The expansion from 36 to 64 channels then follows the scheme outlined above.

Note: An AL001, one Watt load, should be used to terminate all unused divider ports.

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Combining Products

Combining Products

THE FOLLOWING INFORMATION IS REQUIRED WHEN PLACING AN ORDER:

COMBINER..

Exact Tx frequency of each channel
Check Tx/Tx spacing (per catalog specified minimum spacing)

COMBINER EXPANSION HARNESS

New and Existing frequencies
Check combiner minimum spacing (per catalog)

TO PLACE AN ORDER:

IN NORTH AMERICA, MEXICO:

Tel: 1-800/321-4700 Fax: 1-615/641-1910

INTERNATIONAL:

Tel: 1-908/462-1880 Fax: 1-908/431-8388

TECHNICAL SUPPORT:

Tel: 800/659-1880 Fax: 1-908/462-6919

OR CALL...1-800/CELWAVE

Hybrid-Ferrite Transmitter Combiners

TB, TC Series	**High Isolation** 66-88 MHz*
TB, TC Series	**High Isolation** 136-174 MHz*
TH Series	**High Power**
TC Series	**High Isolation** 279-281 MHz*

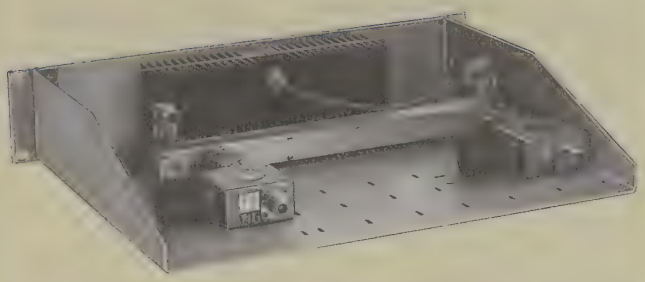
***Exact frequencies must be specified.**

Celwave hybrid-ferrite transmitter combiners are designed to couple multiple close spaced transmitters into one antenna. They are expandable, highly compact and accommodate close channel spacing with very high isolation.

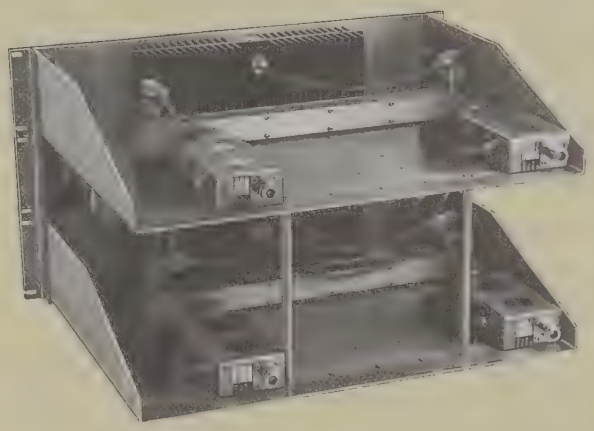
The TBC and TCC are capable of coupling two or four transmitters of up to 125 Watts power rating and are equipped with 60 and 150 Watt loads respectively. Both use CC Series isolators to provide 50 dB minimum isolation. The TBD and TCD Series use CD Series dual isolators to provide 80 dB minimum isolation when the output hybrid is properly tuned to the antenna. A pair of two channel models may be field expanded to four channels by means of a PBH or PCH hybrid coupler panel and CAB-1 cable assembly.

The THC and THD high power units are available in either two or four channel configuration for 350 Watt transmitters. They provide 50 dB and 80 dB minimum isolation respectively.

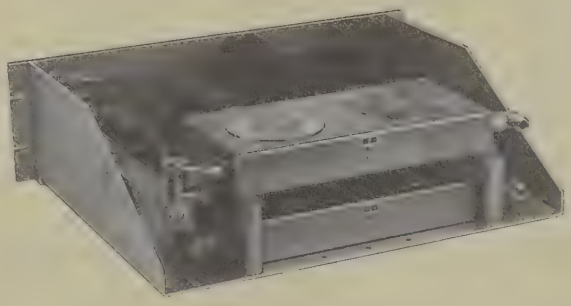
- **Allows combining of multiple close spaced transmitters** — Maximizes use of tower space, reduces costs.
- **No minimum channel separation** — Can be used to combine two transmitters on same frequency.
- **High Isolation** — Minimizes the possibility of intermodulation.
- **Modular** — Simplifies on-site expansion.



TCC078-2



TCD150-4



THD150-2

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Hybrid-Ferrite Transmitter Combiners

2 Channel (66-88 MHz)

	Single Stage		Dual Stage	
ELECTRICAL SPECIFICATIONS	**TBC078-2**	**TCC078-2**	**TBD078-2**	**TCD078-2**
Frequency Range - MHz	66-88	66-88	66-88	66-88
Isolation, Min. Tx-Tx - dB	50	50	80	80
Isolation, Min. Ant.-Tx - dB	28	28	53	53
Insertion Loss, Max. per Channel - dB	4.2	4.2	4.9	4.9
Continuous Power Input, Max. per Channel - Watts	100	100	100	100
Reflected Power, Max. Allowable from Ant. - Watts	60	150	60	150
Channel Separation, for Specifications Given - KHz	25	25	25	25
Temperature Range - °F (°C)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	**TBC078-2**	**TCC078-2**	**TBD078-2**	**TCD078-2**
Dimensions - in. (mm) W x H x D on 19 in. (483 mm) Rack Tray	19 x 3-1/2 x 14 (483 x 89 x 356)		19 x 3-1/2 x 14 (483 x 89 x 356)	
Weight - lbs. (kg)	8.25 (3.75)	10.38 (4.71)	9.25 (4.2)	11.38 (5.16)
Connectors	N-female	N-female	N-female	N-female

4 Channel (66-88 MHz)

	Single Stage		Dual Stage	
ELECTRICAL SPECIFICATIONS	**TBC078-4**	**TCC078-4**	**TBD078-4**	**TCD078-4**
Frequency Range - MHz	66-88	66-88	66-88	66-88
Isolation, Min. Tx-Tx - dB	50	50	80	80
Isolation, Min. Ant-Tx - dB	28	28	53	53
Insertion Loss, Max. per Channel - dB	7.5	7.5	8.2	8.2
Continuous Power Input, Max. per Channel - Watts	100	100	100	100
Reflected Power, Max. Allowable from Ant. - Watts	60	150	60	150
Channel Separation, for Specifications Given - KHz	25	25	25	25
Temperature Range - °F (°C)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	**TBC078-4**	**TCC078-4**	**TBD078-4**	**TCD078-4**
Dimensions - in. (mm) W x H x D on 19 in. (483mm) Rack Tray	19 x 10-1/2 x 14 (483 x 267 x 356)		19 x 10-1/2 x 14 (483 x 267 x 356)	
Weight - lbs. (kg)	20 (9.1)	27.3 (12.4)	22 (10)	29.3 (13.3)
Connectors	N-female	N-female	N-female	N-female

CELWAVE®
DIVISION OF RADIO FREQUENCY SYSTEMS INC.

2 Ryan Road, Marlboro, NJ 07746-1899 • **1(800) CELWAVE** • (908)462-1880

Hybrid-Ferrite Transmitter Combiners

2 Channel (136-174 MHz)
(279-281 MHz)

ELECTRICAL SPECIFICATIONS	Single Stage TBC150-2	Single Stage TCC150-2 TCC280-2	Single Stage THC150-2	Dual Stage TBD150-2	Dual Stage TCD150-2 TCD280-2	Dual Stage THD150-2
Frequency Range - MHz	136-174	136-174 279-281	136-174	136-174	136-174 279-281	136-174
Isolation, Min. Tx-Tx - dB	50	50	50	80	80	80
Isolation, Min. Ant.-Tx - dB	28	28	28	53	53	53
Insertion Loss, Max. per Channel - dB	3.9	3.9	3.9	4.3	4.3	4.3
Continuous Power Input, Max. per Channel - Watts	125	125	350	125	125	350
Reflected Power, Max. Allowable from Ant. - Watts	60	150	300	60	150	300
Channel Separation, for Specifications Given - KHz	25	25	25	25	25	25
Temperature Range - °F (°C)			$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)			
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TBC150-2	TCC150-2 TCC280-2	THC150-2	TBD150-2	TCD150-2 TCD280-2	THD150-2
Dimensions - in. (mm) W x H x D on 19 in. (483 mm) Rack Tray	19 x 3-1/2 x 14 (483 x 89 x 356)		19 x 5-1/4 x 14 (483 x 133 x 356)	19 x 3-1/2 x 14 (483 x 89 x 356)		19 x 5-1/4 x 14 (483 x 133 x 356)
Weight - lbs. (kg)	8.25 (3.75)	10.38 (4.71)	21.6 (9.8)	9.25 (4.2)	11.38 (5.16)	35.3 (15.9)
Connectors	N-female	N-female	N-female	N-female	N-female	N-female

4 Channel (136-174 MHz)
(279-281 MHz)

ELECTRICAL SPECIFICATIONS	Single Stage TBC150-4	Single Stage TCC150-4 TCC280-4	Single Stage THC150-4	Dual Stage TBD150-4	Dual Stage TCD150-4 TCD280-4	Dual Stage THD150-4
Frequency Range - MHz	136-174	136-174 279-281	136-174	136-174	136-174 279-281	136-174
Isolation, Min. Tx-Tx - dB	50	50	50	80	80	80
Isolation, Min. Ant-Tx - dB	28	28	28	53	53	53
Insertion Loss, Max. per Channel - dB	7.2	7.2	7.0	7.6	7.6	7.4
Continuous Power Input, Max. per Channel - Watts	125	125	350	125	125	350
Reflected Power, Max. Allowable from Ant. - Watts	60	150	300	60	150	300
Channel Separation, for Specifications Given - KHz	25	25	25	25	25	25
Temperature Range - °F (°C)			$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)			
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TBC150-4	TCC150-4 TCC280-4	THC150-4	TBD150-4	TCD150-4 TCD280-4	THD150-4
Dimensions - in. (mm) W x H x D on 19 in. (483 mm) Rack Tray	19 x 10-1/2 x 14 (483 x 267 x 356)		19 x 16 x 16 (483 x 406 x 406)	19 x 10-1/2 x 14 (483 x 267 x 356)		19 x 16 x 16 (483 x 406 x 406)
Weight - lbs. (kg)	20 (9.1)	27.3 (12.4)	57.3 (25.9)	22 (10)	29.3 (13.3)	84.3 (38.2)
Connectors	N-female	N-female	N-female	N-female	N-female	N-female

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406-512 / 806-1000 MHz

Hybrid-Ferrite Transmitter Combiners

TB, TC Series	**High Isolation** 406-512 MHz*
TH Series	**High Power**
TB, TC Series	**High Isolation** 806-1000 MHz*
TH Series	**High Power**

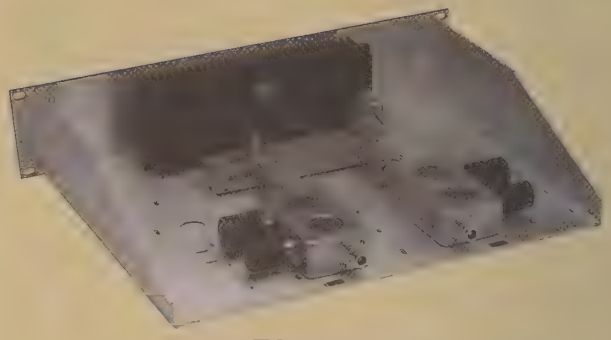
***Exact frequencies must be specified.**

These Celwave combiners are designed to maximize use of tower space and reduce costs by coupling multiple close spaced transmitters into one antenna. They are highly compact, modular and accommodate close channel spacing with very high isolation.

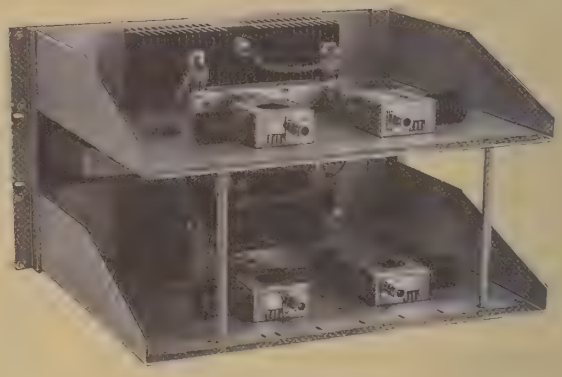
The TBC and TCC are capable of coupling two or four transmitters of up to 125 Watts power rating and are equipped with 60 and 150 Watt loads respectively. Both use our CC Series isolators to provide 50 dB minimum isolation. The TBD and TCD Series use our CD Series dual isolators to provide 80 dB minimum isolation when the output hybrid is properly tuned to the antenna. A pair of two channel units may be field expanded to four channels by means of a PBH or PCH hybrid coupler panel and a CAB-1 cable assembly.

The THC and THD high power units are available in either two or four channel configuration for 350 Watt transmitters. They provide 50 dB and 80 dB minimum isolation respectively.

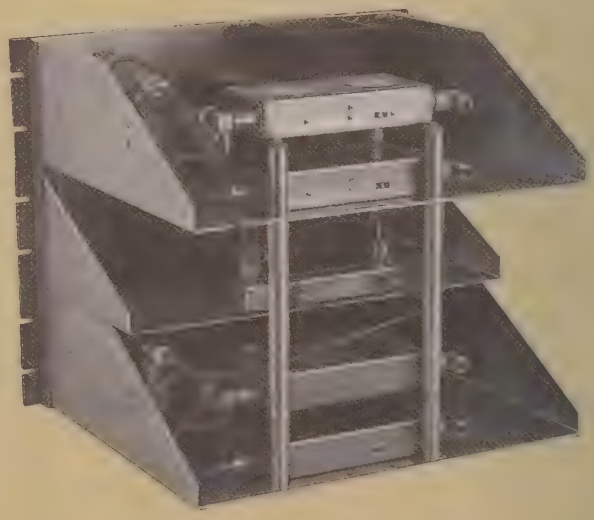
- **Allows combining of multiple close spaced transmitters** — Maximizes use of tower space, reduces costs.
- **No minimum channel separation** — Can be used to combine two transmitters on same frequency.
- **High Isolation** — Minimizes the possibility of intermodulation.
- **Modular** — Simplifies on-site expansion.



TCD460-2



TCC460-4



THD460-4

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Hybrid-Ferrite Transmitter Combiners

2 Channel (406-512 MHz)

ELECTRICAL SPECIFICATIONS	Single Stage			Dual Stage		
	TBC460-2	TCC460-2	THC460-2	TBD460-2	TCD460-2	THD460-2
Frequency Range - MHz	406-512	406-512	406-512	406-512	406-512	406-512
Isolation, Min. Tx-Tx - dB	50	50	50	80	80	80
Isolation, Min. Ant.-Tx - dB	28	28	28	53	53	53
Insertion Loss, Max. per Channel - dB	3.9	3.9	3.9	4.2	4.2	4.3
Continuous Power Input, Max. per Channel - Watts	125	125	300	125	125	300
Reflected Power, Max. Allowable from Ant. - Watts	60	150	300	60	150	300
Channel Separation, for Specifications Given - KHz	25	25	25	25	25	25
Temperature Range - °F (°C)			-22 to +140 (-30 to +60)			
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TBC460-2	TCC460-2	THC460-2	TBD460-2	TCD460-2	THD460-2
Dimensions - in. (mm) W x H x D on 19 in. (483 mm) Rack Tray	19 x 3-1/2 x 14 (483 x 89 x 356)		19 x 5-1/4 x 14 (483 x 133 x 356)	19 x 3-1/2 x 14 (483 x 89 x 356)		19 x 5-1/4 x 14 (483 x 133 x 356)
Weight - lbs. (kg)	8.25 (3.71)	10.38 (4.67)	21.6 (9.72)	9.25 (4.16)	11.38 (5.12)	26.8 (12.1)
Connectors	N-female	N-female	N-female	N-female	N-female	N-female

4 Channel (406-512 MHz)

ELECTRICAL SPECIFICATIONS	Single Stage			Dual Stage		
	TBC460-4	TCC460-4	THC460-4	TBD460-4	TCD460-4	THD460-4
Frequency Range - MHz	406-512	406-512	406-512	406-512	406-512	406-512
Isolation, Min. Tx-Tx - dB	50	50	50	80	80	80
Isolation, Min. Ant-Tx - dB	28	28	28	53	53	53
Insertion Loss, Max. per Channel - dB	7.1	7.1	7.0	7.4	7.4	7.4
Continuous Power Input, Max. per Channel - Watts	125	125	300	125	125	300
Reflected Power, Max. Allowable from Ant. - Watts	60	150	300	60	150	300
Channel Separation, for Specifications Given - KHz	25	25	25	25	25	25
Temperature Range - °F (°C)			-22 to +140 (-30 to +60)			
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TBC460-4	TCC460-4	THC460-4	TBD460-4	TCD460-4	THD460-4
Dimensions - in. (mm) W x H x D on 19 in. (483 mm) Rack Tray	19 x 10-1/2 x 14 (483 x 267 x 356)		19 x 16 x 16 (483 x 406 x 406)	19 x 10-1/2 x 14 (483 x 267 x 356)		19 x 16 x 16 (483 x 406 x 406)
Weight - lbs. (kg)	20 (9.0)	27.3 (12.3)	56.3 (25.3)	22 (10)	29.3 (13.2)	67.3 (30.28)
Connectors	N-female	N-female	N-female	N-female	N-female	N-female

Hybrid-Ferrite Transmitter Combiners

2 Channel (806-1000 MHz)

ELECTRICAL SPECIFICATIONS	TBC800-2	Single Stage TCC800-2	THC800-2	TBD800-2	Dual Stage TCD800-2	THD800-2
Frequency Range - MHz	806-1000	806-1000	806-1000	806-1000	806-1000	806-1000
Isolation, Min. Tx-Tx - dB	50	50	50	80	80	80
Isolation, Min. Ant.-Tx - dB	28	28	28	53	53	53
Insertion Loss, Max. per Channel - dB	3.9	3.9	3.8	4.2	4.2	4.0
Continuous Power Input, Max. per Channel - Watts	150	150	300	150	150	300
Reflected Power, Max. Allowable from Ant. - Watts	60	150	300	60	150	300
Channel Separation, for Specifications Given - KHz	25	25	25	25	25	25
Temperature Range - °F (°C)			$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)			
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TBC800-2	TCC800-2	THC800-2	TBD800-2	TCD800-2	THD800-2
Dimensions - in. (mm) W x H x D on 19 in. (483 mm) Rack Tray	19 x 3-1/2 x 14 (483 x 89 x 356)		19 x 5-1/4 x 14 (483 x 133 x 356)	19 x 3-1/2 x 14 (483 x 89 x 356)		19 x 5-1/4 x 14 (483 x 133 x 356)
Weight - lbs. (kg)	8.25 (3.71)	10.38 (4.67)	21.3 (9.6)	9.25 (4.2)	11.38 (5.12)	26.8 (21.1)
Connectors	N-Female	N-Female	N-Female	N-Female	N-Female	N-Female

4 Channel (806-1000 MHZ)

ELECTRICAL SPECIFICATIONS	TBC800-4	Single Stage TCC800-4	THC800-4	TBD800-4	Dual Stage TCD800-4	THD800-4
Frequency Range - MHz	806-1000	806-1000	806-1000	806-1000	806-1000	806-1000
Isolation, Min. Tx-Tx - dB	50	50	50	80	80	80
Isolation, Min. Ant.-Tx - dB	28	28	28	53	53	53
Insertion Loss, Max. per Channel - dB	7.1	7.1	7.0	7.4	7.4	7.2
Continuous Power Input, Max. per Channel - Watts	150	150	300	150	150	300
Reflected Power, Max. Allowable from Ant. - Watts	60	150	300	60	150	300
Channel Separation, for Specifications Given - KHz	25	25	25	25	25	25
Temperature Range - °F (°C)			$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)			
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TBC800-4	TCC800-4	THC800-4	TBD800-4	TCD800-4	THD800-4
Dimensions - in. (mm) W x H x D on 19 in. (483 mm) Rack Tray	19 x 10-1/2 x 14 (483 x 267 x 356)		19 x 16 x 16 (483 x 406 x 406)	19 x 10-1/2 x 14 (483 x 267 x 356)		19 x 16 x 16 (483 x 406 x 406)
Weight - lbs. (kg)	20 (9.0)	27.3 (12.3)	56.3 (25.3)	22 (10)	29.3 (13.2)	67.3 (30.28)
Connectors	N-Female	N-Female	N-Female	N-Female	N-Female	N-Female

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Hybrid-Ferrite Transmitter Combiners

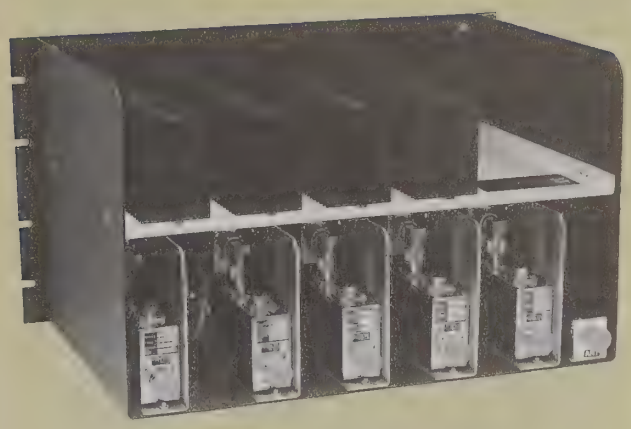
TCD900-5

Designed for the close spaced channels of 900 MHz trunking, these combiners permit maximum use of expensive tower space and considerably reduce the cost of multiple antennas, dedicated cable transmission line and installation. These combiners are expandable, highly compact and accommodate close channel spacing with high isolation. Two of these five channel units can be used along with a PCH800 Hybrid Coupler Panel to combine ten 900 MHz SMR transmit channels.

The TCD900-5 uses CD Series dual isolators to provide 70 dB minimum isolation between inputs.

- **High isolation** — Minimized the possibility of intermodulation.
- **Expandable** — Lowers on-site costs.

WHEN ORDERING:
Provide exact Tx frequency of each channel and check Tx/Tx spacing (per catalog specified minimum.)



TCD900-5

ELECTRICAL SPECIFICATIONS	TCD900-5
Frequency Range - MHz	806-960
Isolators per Channel	2
Isolation, Min. Tx-Tx - dB	71; 85 Typical
Isolation, Min. Ant.-Tx - dB	57
Insertion Loss, Max. per Channel - dB	7.9; 7.7 Typical
Continuous Power Input, Max. per Channel - Watts	150
Reflected Power, Max. Allowable from Ant. - Watts	60
Useable Bandwidth - MHz	50
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)
VSWR, Max. All Ports	1.35:1

MECHANICAL SPECIFICATIONS	TCD900-5
Dimensions - in. (mm) W x H x D on 19 in. (483 mm) Rack Tray	19 x 10-1/2 x 12 (483 x 267 x 305)
Weight - lbs. (kg)	30 (13.5)
Connectors	N-female

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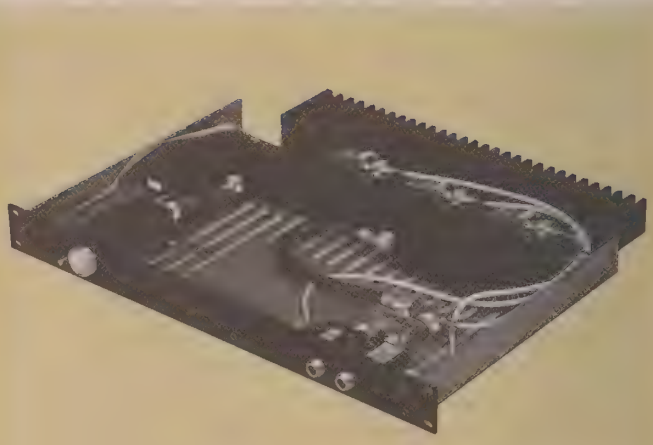
GSM and EGSM Wideband Combiners

TH9021-1 **2 Channel**
TH9011-1 **1 Channel**
TH9021-2 **2 Channel**

The Celwave GSM and EGSM wideband transmitter combiners are capable of coupling 1,2,3 or 4 transmitters to one antenna. This design features internal cables that are cut to the shortest length possible. The Tx filter components are silver plated to ensure low insertion loss and minimize intermodulation. In addition, these combiners have built-in single stage isolators and VSWR alarm output with LED indicator. The alarm monitors the VSWR at the antenna output and can be remotely monitored through a customer specified interface (fx. open collector). Two separate alarm levels can be set to customer specifications.

- **No min. channel separation** — Can be used to combine multiple transmitters in any frequency plan.
- **Low loss** — Maximizes system performance.
- **High isolation** — Minimizes transmitter IM.



TH9021-1

Ordering Information

Item Number	Frequency Range - MHz	Number of Channels
TH9021-1	935-960	2
TH9011-1	925-960	1
TH9021-2	925-960	2

ELECTRICAL SPECIFICATIONS	TH9021-1	TH9011-1	TH9021-2
Number of Channels	2*	1	2
Frequency Range - MHz	935-960	925-960	925-960
Bandwidth - MHz	25	35	35
Isolation Tx - Tx, Min. - dB	40	48	48
Isolation ANT - Tx, Min. - dB	20	23	23
Insertion Loss Isolator, Max./Ch. - dB	5.0	2.0	5.2
Power Input / Ch. - Watts	60	40	40
Temperature Range - °F(°C)	-14 to +140 (-10 to +60)	-14 to +140 (-10 to +60)	-14 to +140 (-10 to +60)
Input - VSWR, Max.	1.2:1	1.2:1	1.2:1
Output - VSWR, Max.	1.7:1	1.5:1	1.5:1
Attenuation at Rx Freq., Min. - dB	72	75	75
Test Coupling Loop - dB	40 ±1	37.5 ±1	37.5 ±1
Passband Ripple, Max. - dB	1.0	1.0	1.0
3rd Order Intermodulation @2 x Max.Power - dBm	< -103	< -105	< -105

MECHANICAL SPECIFICATIONS	TH9021-1	TH9011-1	TH9011-2
Dimensions - WxHxD in. mm.	19.0x1.7x13.8 (483x44x350)	19.0x1.7x13.8 (483x44x350)	19.0x1.7x13.8 (483x44x350)
Weight - lbs.(kg)	18.74(8.5)	15.43(7.0)	16.53(7.5)
Connector Type - Input Output	N-Female 7/16 Female	N-Female 7/16 Female	N-Female 7/16 Female

**Can be reconfigurated in the field to one channel. In this case, max. insertion loss is 1.8 dB, contact Celwave Sales Engineering for more information or for further specifications about the 3 and 4 channel combiners.*

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High Power Cellular Combiners

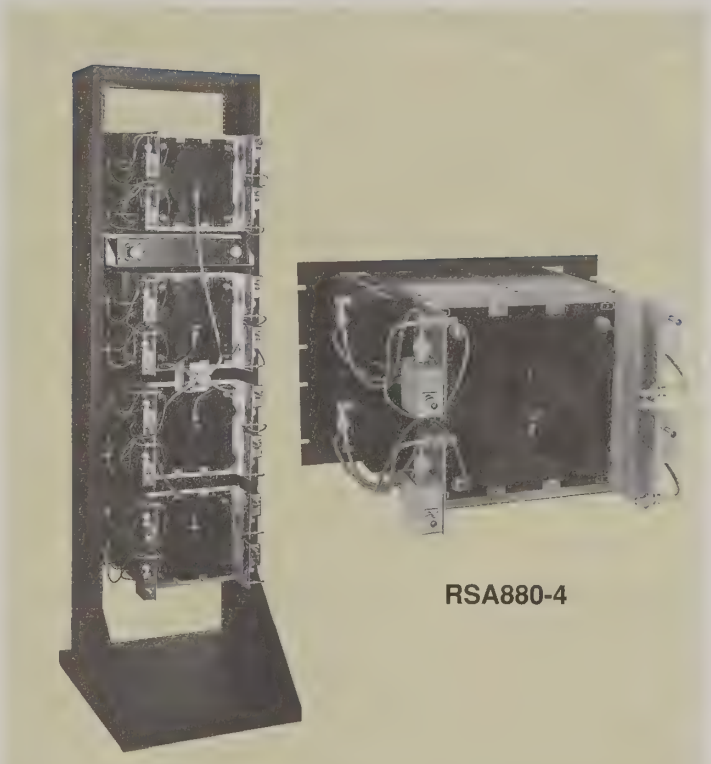
RSA880 Series*

***Exact frequency must be specified.**

These combiners are available with or without isolators and offer a modular, 4-channel design that lets you start small and expand easily as your system grows. All meet maximum RSA power output levels and can operate continuously at transmitter outputs of 200 Watts per channel. The patent pending "Barbell" center tuning assembly dissipates high heat, lowers overall internal temperature for optimum frequency stability and minimum insertion loss.

- **Patented "Barbell" tuning assembly** — Long term system reliability.
- **200 Watts/channel input** — RSA 500 Watt ERP levels easier to obtain.
- **Integrated design** — Lower loss, increased system reliability and performance.
- **Temperature compensated** — Ensures consistent performance across temperature and power range.

U.S. PATENT #4,933,652



RSA880-16 †

RSA880-4

† Rack and duplexer not included.

ELECTRICAL SPECIFICATIONS	RSA880-4	RSA880-8	RSA880-12	RSA880-16
Frequency Range - MHz	869-894	869-894	869-894	869-894
Bandwidth - MHz	25	25	25	25
Isolation, Min. Tx-Tx - dB	38	38	38	38
Isolation, Min. Ant.-Tx - dB	25	25	25	25
Insertion Loss, Max. per Channel - dB	2.3	2.9	3.1	3.2
Continuous Power Input, Max. per Channel - Watts	200	200	200	200
Reflected Power, Max. Allowable from Ant. - Watts	150	150	150	150
Channel Separation, for Specs Given - MHz	0.63	0.63	0.63	0.63
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)	
Input Return Loss, Min. - dB	18	18	18	18
Output Return Loss, Min. - dB	14	14	14	14

MECHANICAL SPECIFICATIONS	RSA880-4	RSA880-8	RSA880-12	RSA880-16
Dimensions - in. (mm) W x H x D	19 x 12-1/4 x 18-1/2 (483 x 311 x 470)	19 x 24-1/2 x 18-1/2 (483 x 622 x 470)	19 x 36-3/4 x 18-1/2 (483 x 933 x 470)	19 x 49 x 18-1/2 (483 x 1244 x 470)
Weight - lbs. (kg)	51 (23)	104 (47)	156 (70)	209 (94)
Connectors	Module Input and Output Connectors are N-female. Junction Output (with 8 or more channels) is LC-female.			

Note: Specifications listed are for single isolator units.

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Compact Cellular Transmitter Combiners

SM880 Series* — Low Power

*Exact frequency must be specified.

The SM880 series of combiners employ the proven integrated design concept first implemented in our SJ880 series of combiners. The SM880 series is reduced in size to allow two four-channel modules to be placed side by side in a standard 19 inch rack. Their small size allows a complete 16 channel group to be fitted into 10 rack spaces, or 17.5 inches! The four channel modular "building blocks" allow for site growth in four channel increments. Single isolators are used in each channel, but two per channel can be supplied. The SMC models feature single isolators.

- **Modular** — Facilitates on-site expansion.
- **Compatible** — Can be added to most existing combiners.
- **Small size** — Reduces cell site space requirements.
- **Strong and lightweight** — Ease of installation, excellent durability.
- **Integrated design** — Lower loss, improved system performance and MTBF.
- **Temperature compensated** — Assures consistent performance at temperature extremes.

WHEN ORDERING:
Provide exact Tx frequency of each channel and check Tx/Tx spacing (per catalog specified minimum.)

SM880-4

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Compact Cellular Transmitter Combiners

ELECTRICAL SPECIFICATIONS	4 Channel w/o Isolators SM880-4	4 Channel Single Isolators SMC880-4	8 Channel w/o Isolators SM880-8	8 Channel Single Isolators SMC880-8
Frequency Range - MHz	851-960	851-960	851-960	851-960
Bandwidth - MHz Isolator	—	50	—	50
Isolation, Min. Tx-Tx - dB	13	38	13	38
Isolation, Min. Ant.-Tx - dB	—	25	—	25
Insertion Loss, Max. per Channel - dB	2.2	2.5	2.5	2.8
Continuous Power Input, Max. per Channel - Watts	70	70	70	70
Reflected Power, Max. Allowable from Ant. - Watts	—	60	—	60
Channel Separation, for Specifications Given - MHz	.630	.630	.630	.630
Channel Separation, Min. - MHz	.500	.500	.500	.500
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)	
Input Return Loss - dB	14	19	14	19
Output Return Loss - dB	14	14	14	14

MECHANICAL SPECIFICATIONS	SM880-4	SMC880-4	SM880-8	SMC880-8
Dimensions - in. (mm) W x H x D	8-3/4 x 8-3/4 x 18 (222 x 222 x 457)	8-3/4 x 8-3/4 x 18 (222 x 222 x 457)	17-1/2 x 8-3/4 x 18 (444 x 222 x 457)	17-1/2 x 8-3/4 x 18 (444 x 222 x 457)
Weight - lbs. (kg)	14 (6.4)	18 (8.2)	28 (12.7)	35.7 (16.2)
Connectors	N-female	N-female	N-female	N-female

ELECTRICAL SPECIFICATIONS	12 Channel w/o Isolators SM880-12	12 Channel Single Isolators SMC880-12	16 Channel w/o Isolators SM880-16	16 Channel Single Isolators SMC880-16
Frequency Range - MHz	851-960	851-960	851-960	851-960
Bandwidth - MHz Isolator	—	50	—	50
Isolation, Min. Tx-Tx - dB	13	38	13	38
Isolation, Min. Ant.-Tx - dB	—	25	—	25
Insertion Loss, Max. per Channel - dB	2.7	3.0	2.9	3.2
Continuous Power Input, Max per Channel - Watts.	70	70	70	70
Reflected Power, Max. Allowable from Ant. - Watts	—	60	—	60
Channel Separation, for Specifications Given - MHz	.630	.630	.630	.630
Channel Separation, Min. - MHz	.500	.500	.500	.500
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)	
Input Return Loss - dB	14	19	14	19
Output Return Loss - dB	14	14	14	14

MECHANICAL SPECIFICATIONS	SM880-12	SMC880-12	SM880-16	SMC880-16
Dimensions - in. (mm) W x H x D	17-1/2 x 17-1/2 x 18 (444 x 444 x 457)	17-1/2 x 17-1/2 x 18 (444 x 444 x 457)	17-1/2 x 17-1/2 x 18 (444 x 444 x 457)	17-1/2 x 17-1/12 x 18 (444 x 444 x 457)
Weight - lbs. (kg)	41.5 (19)	53.5 (24.3)	56 (26)	71.5 (32.4)
Connectors	N-female	N-female	N-female	N-female

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118-136/136-174
150-174/279-281 MHz

Cavity-Ferrite Transmitter Combiners

TJ125 Series*	**6 Inch Cavity**
TJ140 Series*	**6 Inch Cavity**
TJ150 Series*	**6 Inch Cavity High Selectivity**
TL140 Series*	**6 Inch Cavity**
TL150 Series*	**8 Inch Cavity**
TJ220 Series*	**6 Inch Cavity**
TL280 Series*	**8 Inch Cavity**

***Exact frequencies must be specified.**

Each of these Celwave cavity-ferrite combiners utilizes a precisely tuned copper cavity junctioned with our single, dual or triple isolator. They are designed to couple several transmitters into one antenna.

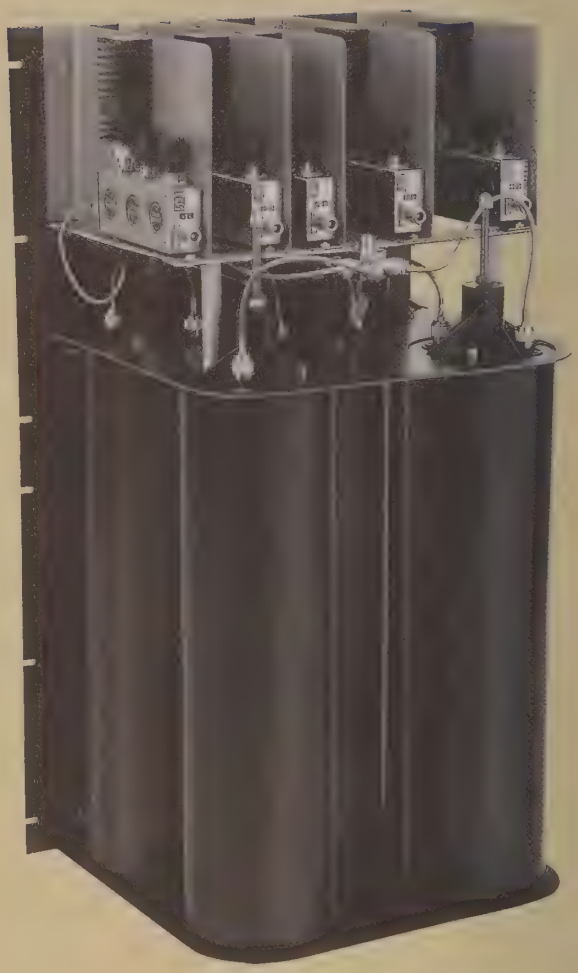
The TJ Series is available in either 2, 3, 4 or 5 channel units or in multiples of up to 20 channels. Minimum channel spacing is 120 KHz. The TJ Series is designed for maximum Q, excellent heat transfer and the lowest possible insertion loss. Each unit is factory tuned and mounted on a standard 19 inch rack panel.

The TL Series is used to couple multiple transmitters with a minimum frequency spacing of 75 KHz to one antenna with the lowest possible loss per channel. Higher power units are available. Contact our Customer Service Department for details.

- **Allows combining of two or more transmitters** — Maximizes use of tower space, reduces costs.
- **High isolation** — Minimizes intermodulation.
- **Modular** — Simplifies on-site expandability.
- **Fully temperature compensated** — Ensures consistent performance across temperature and power range.

Field Expansion - To combine multiple cavities requires additional modules and frequency dependent cable harness. Both new and old frequencies must be specified.

Note: All models are available with single, dual and triple stage isolators.



TJT150-5

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Cavity-Ferrite Transmitter Combiners

ELECTRICAL SPECIFICATIONS	Single Stage TJC125-2	2 Channels Dual Stage TJD125-2	Single Stage TJC140-2	Dual Stage TJD140-2
Frequency Range - MHz	118-136	118-136	136-150	136-150
Bandwidth - MHz		4 - All Models		
Isolation, Min. Tx-Tx - dB	35	60	35	60
Isolation, Min. Ant.-Tx - dB	25	50	25	50
Insertion Loss, Max. per Channel - dB	2.4	2.8	2.4	2.8
Continuous Power Input, Max. per Channel - Watts	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60
Channel Separation, for Specifications Given - KHz	120	120	120	120
Channel Separation, Min. - KHz	120	120	120	120
Temperature Range - °F (°C)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJC125-2	TJD125-2	TJC140-2	TJD140-2
Dimensions - in. (mm) W x H x D		19 x 35 x 16 (483 x 889 x 406)		
Weight - lbs. (kg)	42 (19.0)	45 (20.4)	42 (19.0)	45 (20.4)
Connectors	N-female	N-female	N-female	N-female

ELECTRICAL SPECIFICATIONS	Single Stage TJC125-3	3 Channels Dual Stage TJD125-3	Single Stage TJC140-3	Dual Stage TJD140-3
Frequency Range - MHz	118-136	118-136	136-150	136-150
Bandwidth - MHz		4 - All Models		
Isolation, Min. Tx-Tx - dB	35	60	35	60
Isolation, Min. Ant.-Tx - dB	25	50	25	50
Insertion Loss, Max. per Channel - dB	2.5	2.9	2.5	2.9
Continuous Power Input, Max. per Channel - Watts	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60
Channel Separation, for Specifications Given - KHz	120	120	120	120
Channel Separation, Min. - KHz	120	120	120	120
Temperature Range - °F (°C)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJC125-3	TJD125-3	TJC140-3	TJD140-3
Dimensions - in. (mm) W x H x D		19 x 35 x 16 (483 x 889 x 406)		
Weight - lbs. (kg)	166 (75.3)	182 (82.6)	166 (75.3)	182 (82.6)
Connectors	N-female	N-female	N-female	N-female

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Cavity-Ferrite Transmitter Combiners

ELECTRICAL SPECIFICATIONS	Single Stage TJC125-4	Dual Stage TJD125-4	Single Stage TJC140-4	Dual Stage TJD140-4
		4 Channels		
Frequency Range - MHz	118-136	118-136	136-150	136-150
Bandwidth - MHz		4 - All Models		
Isolation, Min. Tx-Tx - dB	35	60	35	60
Isolation, Min. Ant.-Tx - dB	25	50	25	50
Insertion Loss, Max. per Channel - dB	2.6	3.0	2.6	3.0
Continuous Power Input, Max. per Channel - Watts	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60
Channel Separation, for Specifications Given - KHz	120	120	120	120
Channel Separation, Min. - KHz	120	120	120	120
Temperature Range - °F (°C)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJC125-4	TJD125-4	TJC140-4	TJD140-4
Dimensions - in. (mm) W x H x D		19 x 35 x 16 (483 x 889 x 406)		
Weight - lbs. (kg)	71 (32.2)	78 (35.4)	71 (32.2)	78 (35.4)
Connectors	N-female	N-female	N-female	N-female

ELECTRICAL SPECIFICATIONS	Single Stage TJC125-5	Dual Stage TJD125-5	Single Stage TJC140-5	Dual Stage TJD140-5
		5 Channels		
Frequency Range - MHz	118-136	118-136	136-150	136-150
Bandwidth - MHz		4 - All Models		
Isolation, Min. Tx-Tx - dB	35	60	35	60
Isolation, Min. Ant.-Tx - dB	25	50	25	50
Insertion Loss, Max. per Channel - dB	2.7	3.1	2.7	3.1
Continuous Power Input, Max. per Channel - Watts	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60
Channel Separation, for Specifications Given - KHz	120	120	120	120
Channel Separation, Min. - KHz	120	120	120	120
Temperature Range - °F (°C)		$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)		
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJC125-5	TJD125-5	TJC140-5	TJD140-5
Dimensions - in. (mm) W x H x D		19 x 35 x 16 (483 x 889 x 406)		
Weight - lbs. (kg)	83 (37.7)	91 (41.3)	83 (37.7)	91 (41.3)
Connectors	N-female	N-female	N-female	N-female

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Cavity-Ferrite Transmitter Combiners

ELECTRICAL SPECIFICATIONS	4 Channel Triple Stage TJT150-4	5 Channel Single Stage TJC150-5	5 Channel Dual Stage TJD150-5	5 Channel Triple Stage TJD220-5
Frequency Range - MHz	136-174	136-174	136-174	220-250
Bandwidth - MHz	4 - All Models		4 - All Models	
Isolation, Min. Tx-Tx - dB	85	35	60	60
Isolation, Min. Ant.-Tx - dB	75	25	50	50
Insertion Loss, Max. per Channel - dB	3.6	2.7	3.1	4.1
Continuous Power Input, Max. per Channel - Watts	125	125	125	100
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60
Channel Separation, for Specifications Given - KHz	120	120	120	150
Channel Separation, Min. - KHz	120	120	120	150
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)		-22 to +140 (-30 to +60)	
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJT150-4	TJC150-5	TJD150-5	TJD220-5
Dimensions - in. (mm) W x H x D	19 x 35 x 16 (483 x 889 x 406)	19 x 35 x 16 (483 x 889 x 406)	19 x 35 x 16 (483 x 889 x 406)	19 x 26 1/4 x 16 (483 x 668 x 406)
Weight - lbs. (kg)	83 (37.6)	83 (37.7)	91 (41.3)	70 (31.7)
Connectors	N-female	N-female	N-female	N-female

ELECTRICAL SPECIFICATIONS	8 Channel Single Stage TLC150-8	8 Channel Dual Stage TLD150-8	10 Channel Single Stage TJC150-10	10 Channel Dual Stage TJD150-10
Frequency Range - MHz	136-174	136-174	136-174	136-174
Bandwidth - MHz		4 - All Models		
Isolation, Min. Tx-Tx - dB	35	60	35	60
Isolation, Min. Ant.-Tx - dB	25	50	25	50
Insertion Loss, Max. per Channel - dB	3.5	3.9	3.4	3.8
Continuous Power Input, Max. per Channel - Watts	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60
Channel Separation, for Specifications Given - KHz	100	100	120	120
Channel Separation, Min. - KHz	75	75	120	120
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)		-22 to +140 (-30 to +60)	
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TLC150-8	TLD150-8	TJC150-10	TJD150-10
Dimensions - in. (mm) W x H x D	19 x 60 x 16 (483 x 1524 x 406)		19 x 70 x 16 (483 x 1778 x 406)	
Weight - lbs. (kg)	166 (75.3)	182 (82.6)	166 (75.3)	182 (82.6)
Connectors	N-female	N-female	N-female	N-female

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Cavity-Ferrite Transmitter Combiners

ELECTRICAL SPECIFICATIONS	2 Channel Single Stage TJC150-2	2 Channel Dual Stage TJD150-2	3 Channel Single Stage TJC150-3	3 Channel Dual Stage TJD150-3
Frequency Range - MHz	150-174	150-174	150-174	150-174
Bandwidth - MHz	4 - All Models			
Isolation, Min. Tx-Tx - dB	35	60	35	60
Isolation, Min. Ant.-Tx - dB	25	50	25	50
Insertion Loss, Max. per Channel - dB	2.4	2.8	2.5	2.9
Continuous Power Input, Max. per Channel - Watts	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60
Channel Separation, for Specifications Given - KHz	120	120	120	120
Channel Separation, Min. - KHz	120	120	120	120
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)			
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJC150-2	TJD150-2	TJC150-3	TJD150-3
Dimensions - in. (mm) W x H x D	19 x 35 x 16 (483 x 889 x 406)			
Weight - lbs. (kg)	42 (19.0)	45 (20.4)	61 (27.7)	66 (30.0)
Connectors	N-female	N-female	N-female	N-female

4 Channel ELECTRICAL SPECIFICATIONS	Single Stage TJC150-4	Single Stage TLC150-4	Single Stage TLC140-4	Single Stage TLC280-4	Dual Stage TJD150-4	Dual Stage TLD150-4	Dual Stage TLD140-4	Dual Stage TLD280-4
Frequency Range - MHz	150-174	150-174	136-150	279-281	150-174	150-174	136-150	279-281
Bandwidth - MHz	4 - All Models							
Isolation, Min. Tx-Tx - dB	35	35	35	38	60	60	60	63
Isolation, Min. Ant.-Tx - dB	25	25	25	25	50	50	50	50
Insertion Loss, Max. per Channel - dB	2.6	3.1	3.1	3.1	3.0	3.5	3.5	3.5
Continuous Power Input, Max. per Channel - Watts	125	125	125	125	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60	60	60	60	60
Channel Separation, for Specifications Given - KHz	120	75	75	125	120	100	75	125
Channel Separation, Min. - KHz	120	75	75	100	120	75	75	100
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)							
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJC150-4	TLC150-4	TLC140-4	TLC280-4	TJD150-4	TLD150-4	TLD140-4	TLD280-4
Dimensions - in. (mm) W x H x D	19 x 35 x 16 (483 x 889 x 406)	19 x 29-3/4 x 17 (483 x 756 x 432)	19 x 29-3/4 x 17 (483 x 756 x 432)	19 x 24-1/2 x 17 (483 x 622 x 432)	19 x 35 x 16 (483 x 889 x 406)	19 x 29-3/4 x 17 (483 x 756 x 432)	19 x 29-3/4 x 17 (483 x 756 x 432)	19 x 24-1/2 x 17 (483 x 622 x 432)
Weight - lbs. (kg)	71 (32.2)	83 (37.7)	83 (37.7)	53 (24)	78 (35.4)	91 (41.3)	91 (41.3)	61 (27.5)
Connectors	N-female	N-female	N-female	N-female	N-female	N-female	N-female	N-female

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Cavity-Ferrite Transmitter Combiners

TJ355 Series*	**6 Inch Cavity**
TJ420 Series*	**6 Inch Cavity**
TJ460 Series*	**6 Inch Cavity**
TL425 Series*	**8" High Selectivity**
TL460 Series*	**8" High Selectivity**

*** Exact frequencies must be specified.**

Each of these Celwave units uses a precision-tuned copper cavity in combination with a single, dual or triple isolator.

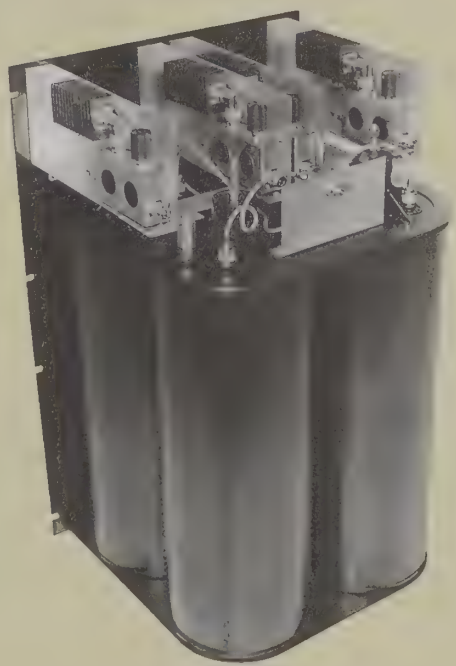
The TJ355 and TJ460 can couple multiple transmitters to one antenna when frequency separation is at least 225 KHz and 250 KHz. These factory tuned combiners are available in either 2, 3, 4, 5, or 10 channel versions and may be easily expanded up to 20 channels in the field. They provide maximum Q, excellent heat transfer and the lowest possible insertion loss.

The TL Series is used to couple multiple transmitters to one antenna in the 406-512 MHz frequency range, minimum separation is recommended at 150 KHz. Featuring our PD5013-A eight inch optimized Q cavity and single, dual or triple isolator, these combiners provide the lowest possible loss per channel and the greatest amount of transmitter noise protection for receivers. High power units are available. Contact our Customer Service Department for details.

- **Low loss** — Maximizes system performance.
- **High isolation** — Minimizes possibility of intermodulation.
- **Modular** — Easily expandable in the field.
- **Fully temperature compensated** — Ensures consistent performance across temperature and power range.

Field Expansion – To combine multiple cavities requires additional modules and frequency dependent cable harness. Both new and old frequencies must be specified.

TJD460-5



TLD460-4

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Cavity-Ferrite Transmitter Combiners

ELECTRICAL SPECIFICATIONS	Single Stage TJC355-5	Dual Stage TJD355-5	Single Stage TJC420-5	5 Channel Dual Stage TJD420-5	Single Stage TJC460-5	Dual Stage TJD460-5	Triple Stage TJT460-5
Frequency Range - MHz	320-360	320-360	406-460	406-460	406-512	406-512	406-512
Bandwidth - MHz	12 - All Models						
Isolation, Min. Tx-Tx - dB	35	60	35	60	35	60	85
Isolation, Min. Ant.-Tx - dB	25	50	25	50	25	50	75
Insertion Loss, Max. per Channel - dB @ 250 KHz	3.15@225KHz	3.5@225KHz	3.4	3.8	3.4	3.8	4.3
@ 500 KHz			2.7	3.1	2.7	3.1	3.6
Continuous Power Input, Max. per Channel - Watts	125	125	125	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60	60	60	60
Channel Separation, Min. - KHz	225	225	250	250	250	250	250
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)						
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJC355-5	TJD355-5	TJC420-5	TJD420-5	TJC460-5	TJD460-5	TJT460-5
Dimensions - in. (mm)	19 x 26.20 x 16.12 (483 x 665 x 409)		19 x 24 x 16 (483 x 610 x 406) - TJC420 and 460 Series				
Weight - lbs. (kg)	53 (24.0)	61 (27.7)	53 (24.0)	61 (27.7)	53 (24.0)	61 (27.7)	67 (30.4)
Connectors	N-female	N-female	N-female	N-female	N-female	N-female	N-female

ELECTRICAL SPECIFICATIONS	Single Stage TLC460-8	8 Channel Dual Stage TLD460-8	Triple Stage TLT460-8	Single Stage TJC460-10	10 Channel Dual Stage TJD460-10	Triple Stage TJT460-10
Frequency Range - MHz	406-512	406-512	406-512	406-512	406-512	406-512
Bandwidth - MHz	12 - All Models					
Isolation, Min. Tx-Tx - dB	35	60	85	35	60	85
Isolation, Min. Ant.-Tx - dB	25	50	75	25	50	75
Insertion Loss, Max. per Channel - dB @ 250 KHz (500 KHz)	—	—	—	3.8 (3.1)	4.2 (3.5)	4.7 (4.0)
@ 150 KHz (250 KHz)	3.4 (3.0)	3.8 (3.4)	4.2 (3.8)	—	—	—
Continuous Power Input, Max. per Channel - Watts	125	125	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60	60	60
Channel Separation, Min. - KHz	150	150	150	250	250	250
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)					
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TLC460-8	TLD460-8	TLT460-8	TJC460-10	TJD460-10	TJT460-10
Dimensions - in. (mm) W x H x D	19 x 59-1/2 x 17 (483 x 1511 x 432)			19 x 48 x 16 (483 x 1219 x 406)		
Weight - lbs. (kg)	166 (75.4)	182 (82.6)	194 (88.0)	106 (48.1)	122 (55.3)	134 (60.8)
Connectors	N-female	N-female	N-female	N-female	N-female	N-female

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Cavity-Ferrite Transmitter Combiners

ELECTRICAL SPECIFICATIONS	2 Channel Single Stage TJC460-2	2 Channel Dual Stage TJD460-2	2 Channel Triple Stage TJT460-2	3 Channel Single Stage TJC460-3	3 Channel Dual Stage TJD460-3	3 Channel Triple Stage TJT460-3
Frequency Range - MHz	406-512	406-512	406-512	406-512	406-512	406-512
Bandwidth - MHz	12 - All Models					
Isolation, Min. Tx-Tx - dB	35	60	85	35	60	85
Isolation, Min. Ant.-Tx - dB	25	50	75	25	50	75
Insertion Loss, Max. per Channel - dB @ 250 KHz	3.1	3.5	3.9	3.2	3.6	4.0
@ 500 KHz	2.8	3.2	3.6	2.7	3.1	3.5
Continuous Power Input, Max. per Channel - Watts	125	125	125	125	125	125
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60	60	60
Channel Separation, Min. - KHz	250	250	250	250	250	250
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)					
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJC460-2	TJD460-2	TJT460-2	TJC460-3	TJD460-3	TJT460-3
Dimensions - in. (mm) W x H x D	19 x 24 x 16 (483 x 610 x 406)					
Weight - lbs. (kg)	33 (15.0)	36 (16.3)	38.4 (17.4)	39 (17.7)	44 (20.0)	47.6 (21.6)
Connectors	N-female	N-female	N-female	N-female	N-female	N-female

4 Channel ELECTRICAL SPECIFICATIONS	Single Stage TJC460-4	Single Stage TLC425-4	Single Stage TLC460-4	Dual Stage TJD460-4	Dual Stage TLD425-4	Dual Stage TLD460-4	Triple Stage TJT460-4	Triple Stage TLT460-4
Frequency Range - MHz	406-512	420-460	406-512	406-512	420-460	406-512	406-512	406-512
Bandwidth - MHz	12 - All Models							
Isolation, Min. Tx-Tx - dB	35	35	35	60	60	60	85	85
Isolation, Min. Ant.-Tx - dB	25	25	25	50	50	50	75	75
Insertion Loss, Max. per Channel - dB @ 250 KHz (500 KHz)	3.3 (2.8)	2.5 (0.0)	—	3.7 (3.27)	2.9 (0.0)	—	4.2 (3.7)	—
@ 150 KHz (250 KHz)	—	2.9 (0.0)	2.9 (2.5)	—	3.3 (0.0)	3.3 (2.9)	—	3.7 (3.3)
Continuous Power Input, Max. per Channel - Watts	125 - All Models							
Reflected Power, Max. Allowable from Ant. - Watts	60	60	60	60	65	60	60	60
Channel Separation, Min. - KHz	250	150	150	250	150	150	250	150
Temperature Range - °F (°C)	-22 to +140 (-30 to +60)							
VSWR, Max. All Ports	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1	1.25:1

MECHANICAL SPECIFICATIONS	TJC460-4	TLC425-4	TLC460-4	TJD460-4	TLD425-4	TLD460-4
Dimensions - in. (mm) W x H x D	19 x 24 x 16 (483 x 610 x 406)	19 x 29-3/4 x 17 (483 x 756 x 432)	19 x 29-3/4 x 17 (483 x 756 x 432)	19 x 24 x 16 (483 x 610 x 406)	19 x 29-3/4 x 17 (483 x 756 x 432)	19 x 29-3/4 x 17 (483 x 756 x 432)
Weight - lbs. (kg)	46 (20.9)	83 (37.7)	83 (37.7)	52 (23.6)	91 (41.3)	91 (41.3)
Connectors	N-female	N-female	N-female	N-female	N-female	N-female

MECHANICAL SPECIFICATIONS	TJT460-4	TLT460-4
Dimensions - in. (mm) W x H x D	19 x 24 x 16 (483 x 610 x 406)	19 x 29-3/4 x 17 (483 x 755 x 432)
Weight - lbs. (kg)	56.8 (25.8)	97 (44.0)
Connectors	N-female	N-female

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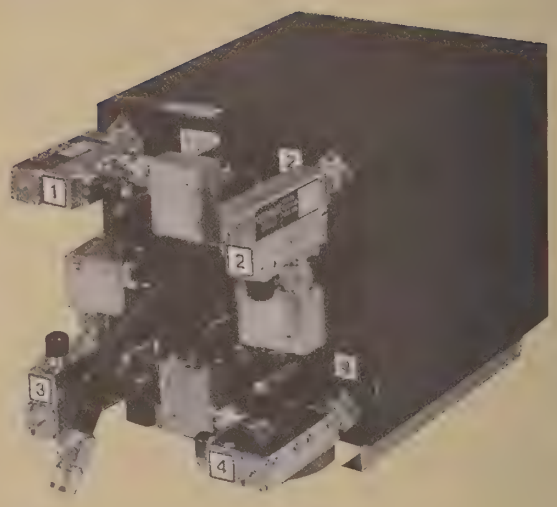
Compact Cavity Combiner

TI90 4 Channel with Dual Stage Isolation

This integrated combiner is designed for trunking and cellular applications in the 935-960 MHz frequency band. It is designed to couple 4 transmitters together into one antenna and additional modules can be coupled together to form an 8, 12 or 16 channel system. Each channel is equipped with a dual stage isolator and is temperature compensated over the range -14° to +140°F. This compact combiner fits into a standard 19" rack and takes up only 5 rack units in height.

- **Compact design** — Fits into a standard 19" rack.
- **Integrated design** — Lower loss, increased system reliability and performance.
- **Temperature stabilized** — Assures frequency stability.



TI90

ELECTRICAL SPECIFICATIONS	TI90-4	TI90-8	TI90-12	TI90-16
Frequency Range* - MHz	935-960			
Channel Separation, Min. - MHz	600			
Bandwidth, Each Isolator - MHz	25			
Bandwidth Combiner - MHz	25			
Insertion Loss** - Max./Ch. - dB	2.8	3.4	3.8	4.2
Input - VSWR, Max.	1.3:1			
Output - VSWR, Max.	1.5:1	1.8:4	1.9:1	1.9:1
Isolation Tx - Tx, Min. - dB	60			
Isolation ANT - Tx, Min. - dB	52			
Reflected Power - Max./Ch. - Watts	30			
Temperature Range - °F(°C)	-14 to +140(-10 to +60)			

MECHANICAL SPECIFICATIONS	TI90-4	TI90-8	TI90-12	TI90-16
Dimensions - WxHxD in. (mm.)	8.66x8.66x15.75 (220x220x400)			
Weight - lbs.(kg)	30.87(14)			
Shipping Weight - lbs. (kg)	37.5(17)			
Connector Type - Input	N-Female			
Test Port Connectors	N-Male			

** Frequency range can be increased to 917-970 MHz, contact Celwave Sales Engineering for more information.*
*** Insertion losses given at 600 KHz channel separation and 25° C.*
For more information about interconnection cable harness, contact Celwave Sales Engineering.

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Transmitter Combiner Expansion Kits

Cavity-Ferrite Combiner Channel Expansion Kits

PD656250 for TJD800-2T, 3T, 4T
The three-quarter wave cavity-ferrite transmitter combiners are available in models with fewer than five channels and can be expanded using one PD656250 kit per additional channel.

PD656250 includes:

1. One PD3406 three-quarter wave cavity and cable assembly.
2. One CD800-B dual isolator (60 Watt load) with mounting hardware.
3. Complete installation instructions.

The cavity and isolator are factory tuned to the new channel frequency. Some minor tuning adjustments to the new and existing cavities may be required for optimum performance after installation and are detailed in the instructions. Please specify new and existing frequencies when ordering. Net weight 10 lbs.

Similar expansion kits are available with a single (CC800-B) or triple (CT800-B) isolator in place of the dual isolator.

PD656230 for TJD800-2S, 3S, 4S
Similar to the PD656250 except that a CD800-C isolator, with a 150 Watt load is used to expand the -5S style transmitter combiner. Net weight 23 lbs.

Expansion Kits for TJ150 and TL150 Series, TJ460 and TL460 Series
Consult our Customer Service Department for detailed specifications.

PD656940 Phasing Harness
For expansion from 5 to 10 channel (SJ Series).

Hybrid-Ferrite Combiner Expansion Kit

The TB800, TC800 and TH800 Series Hybrid-Ferrite transmitter combiner are easily expandable with the addition of:

1. One CAB-1 Cable Assembly.
2. One PBH800 (for 60 Watt Tx power) or one PCH800 (for 125 Watt Tx power) Coupler Panel.
3. One two channel tray, special one channel options available.

PD656230

PD656250

EXPANSION KIT

Note: With the addition of each coupler panel the maximum insertion loss will increase by approximately 3.2 dB. Expansion Kits are also available for the TB, TC and TH (070,150 and 460) Series. Consult with our Customer Service Department for detailed specifications.

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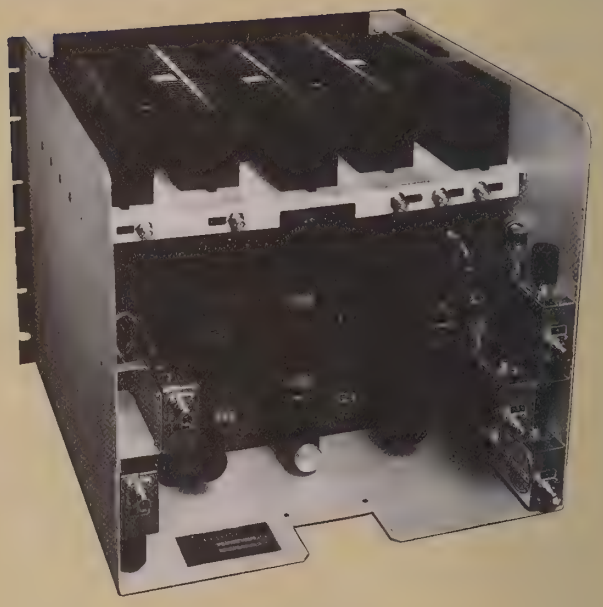
Waveguide Trunking Combiner

WJD860 Series

These combiners are designed specifically for applications in the 851-869 MHz Trunking band. They utilize a combination of ferrite isolators and TE101 waveguide resonators to obtain low insertion loss and high isolation between transmitters with a spacing down to 150 KHz. They are constructed of three, 2 channel modules connected by a coaxial hardline with a 7/16 connector built into each module. The modules are made of copper and temperature compensated with a patented technique to ±0.45ppm with a power dissipation up to 100 Watts.

The WJD860 series are equipped with a 150 Watt dual isolator tuned to maximize performance from 851-869 MHz. The (-T) series has a 60 watt load, while the (-S) is supplied with a 150 watt load allowing 100% reflected power. Expansion kits are available to expand a WJD860 (-2,3,4) to a 3,4, or 5T, capable of handling a maximum of 5 channels.

- **Frequency Spacing** — Can operate as close as 150 or 250 KHz.
- **High Isolation Between Transmitters** — Minimizes transmitter IM.
- **Low Loss** — Maximum system performance.
- **Temperature Compensation** — Consistent performance across operating temperature power range.
- **Higher Q** — 25% more Q.
- **Expandable** — Up to 24 channels.



WJD860-5T

WJD860-1T-EX (expansion kit)

WHEN ORDERING:
Provide exact Tx frequency of each channel and check Tx/Tx spacing (per catalog specified minimum.)

U.S. Patent #5,309,129

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Waveguide Trunking Combiner

ELECTRICAL SPECIFICATIONS	150 KHz Loop Setting										
Frequency Range - MHz	851-869										
Isolation Tx-Tx - dB	64										
Isolation, Min. ant. Tx - dB	50										
Insertion Loss - dB max.	2CH	3CH	4CH	5CH	6CH	10CH	12CH	15CH	18CH	20CH	24CH
150 KHz Spacing	3.6	4.1	4.3	4.5	4.6	4.9	5.0	5.5	5.5*	5.6**	5.6***
250 KHz Spacing	3.3	3.5	3.7	3.8	3.9	4.2	4.3	4.8	4.9	5.1	5.1
500 KHz Spacing	3.0	3.3	3.4	3.5	3.6	3.8	3.9	4.2	4.3	4.4	4.4
1000 KHz Spacing	2.9	3.1	3.3	3.4	3.5	3.7	3.8	4.1	4.1	4.2	4.2
Maximum Input Power - Watts	150										
Reflected Power, Max. - Watts	T (60)										
Allowable from Antenna - Watts	S (150)										
Channel Separation - KHz	150	150	150	150	150	150	150	150	*	**	***
Input Return Loss - dB	20										
Output Return Loss - dB	9.5	9.5	9.5	9.5	9.5	8.5	8.5	7.0	7.0	7.0	7.0
Sampling Port	-35dB ± 3dB										
Connectors - Input Side	N-Female										
Output Side	7/16										
Sampler Port	BNC										
In Band IM	-80 dBC										
Stability (-22 to 122°F)	± 0.45 ppm										

ELECTRICAL SPECIFICATIONS	250 KHz Loop Setting										
Frequency Range - MHz	851-869										
Isolation Tx-Tx - dB	64										
Isolation, Min. ant. Tx - dB	50										
Insertion Loss - dB max.	2CH	3CH	4CH	5CH	6CH	10CH	12CH	15CH	18CH	20CH	24CH
250 KHz Spacing	2.9	3.1	3.2	3.3	3.4	3.6	3.8	4.4	4.6	5.0***	5.0****
500 KHz Spacing	2.5	2.5	2.5	2.6	2.7	2.9	3.1	3.7	3.9	4.3	4.3
1000 KHz Spacing	2.5	2.5	2.5	2.5	2.6	2.8	3.0	3.6	4.0	4.1	4.1
Maximum Input Power - Watts	150										
Reflected Power, Max. - Watts	T (60)										
Allowable from Antenna - Watts	S (150)										
Channel Separation - KHz	250	250	250	250	250	250	250	250	250	***	****
Input Return Loss - dB	20										
Output Return Loss - dB	12.0	12.0	12.0	12.0	11.0	10.0	9.5	9.5	8.0	8.0	8.0
Sampling Port	-35dB ± 3dB										
Connectors - Input Side	N-Female										
Output Side	7/16										
Sampler Port	BNC										
In Band IM	-80 dBC										
Stability (-22 to 122°F)	± 0.45 ppm										

*Every other channel must be separated by at least 225 KHz.
**Every other channel must be separated by at least 250 KHz.
***Every other channel must be separated by at least 300 KHz.
****Every other channel must be separated by at least 350 KHz.

MECHANICAL SPECIFICATIONS		2CH	3CH	4CH	5CH	6CH	10CH	12CH	15CH	18CH	20CH	24CH
Height - in.	S Version	15.75	15.75	15.75	15.75	15.75	31.50	31.50	47.25	47.25	63.00	63.00
	T Version	10.50	10.50	10.50	10.50	N/A	21.00	N/A	31.50	N/A	42.00	N/A
Width - in.		19.00										
Depth - in.		17.625										
Weight - lbs.	S Version	95	95	95	95	101	190	202	285	303	380	404
	T Version	90	90	90	90	N/A	185	N/A	280	N/A	375	N/A

ORDERING INFORMATION	10CH WJD860-10S	12CH WJD860-10S	15CH WJD860-15S	18CH WJD860-18S	20CH WJD860-20S	24CH WJD860-24S
Cable Harness P/N	692600	692600	692610	692610	692620	692620

Expansion kits are available and can be used to expand a WJD860-(2,3 or 4) T unit to a 3, 4 or 5T, capable of handling a max. of 5 channels.

High Power Waveguide Combiner

SKD940-4/-5 High Power

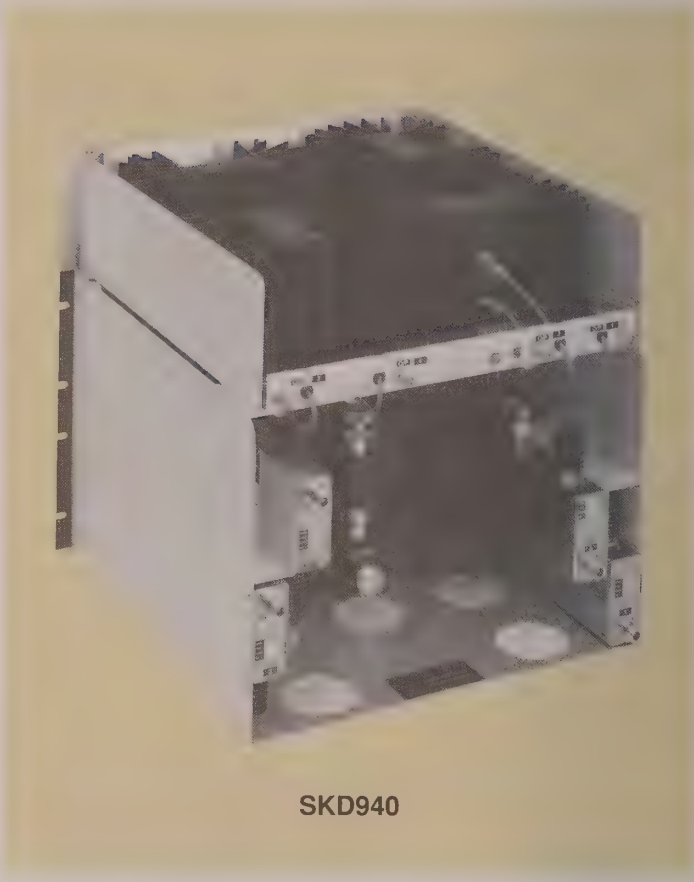
These combiners are designed specifically for applications in 900 MHz Paging band and for expanded 900 MHz Trunking channels. Combiners in this series employ a combination of ferrite and TE101 waveguide resonators to obtain low insertion loss and high isolation between transmitters with a spacing down to 250 KHz.

The SKD940-4 waveguide combiner is built of two channel modules connected by a coaxial hardline with a 7/16 connector built into each module. The combiner tray, without loads, is designed to hold up to five channels. Expansion from four to five channels is done by adding a third module where one channel has been disconnected to make that module into a "one channel module."

The modules are constructed of copper and temperature compensated with a special technique to ±0.45ppm with a power dissipation up to 115 Watts in each channel. This combiner is equipped with 350 Watt dual isolators tuned to maximum performance from 915-950 MHz. Each isolator is equipped with a 300 Watt load allowing 100% reflected power.

- **Low Insertion Loss** — Maximizes system performance.
- **High Isolation Between Transmitters** — Minimizes transmitter IM.
- **High Power** — 350 Watt max. input power.
- **Expandable** — 4 to 5 channels by simply adding a third module.

WHEN ORDERING:
Provide exact Tx frequency of each channel and check Tx/Tx spacing (per catalog specified minimum.)



SKD940

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High Power Waveguide Combiner

ELECTRICAL SPECIFICATIONS	SKD940-4	SKD940-5
Frequency Range - MHz	925-940	
Isolation Tx-Tx - dB	64	
Insertion Loss - dB max.		
250 KHz Spacing	3.3	3.5
Maximum Input Power - Watts	350	
Maximum Reflected Power - Watts	300	
Input Return Loss - dB	20	
Output Return Loss - dB	12	
Sampling Port	-35dB ± 3dB	
Connectors - Input Side	N-Female	
Output Side	7/16	
Sample Port	BNC	
In Band IM	-85 dBC	
Stability (-22 to 122°F)	± 0.45 ppm	

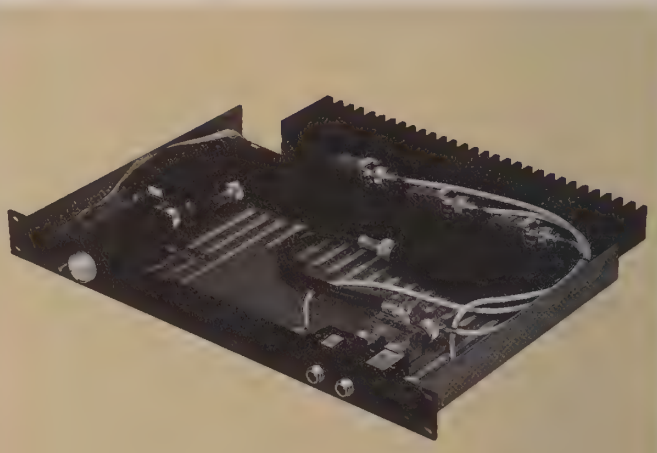
MECHANICAL SPECIFICATIONS	SKD940-4	SKD940-5
Height - in. (mm)	10" Rack Spaces (254)	13" Rack Spaces (330)
Width - in. (mm)	19" Standard Rack (483)	
Depth - in. (mm)*	18.75 (476)	
Weight (combiner unit) - lbs. (kg)	55 (25)	77 (35)
Weight (quadruple load tray) - lbs. (kg)	26 (12)	26 (12)

**Includes input connector*

DCS and PCS Wideband Combiners

TH1811-1 **1 Channel**
TH1821-1 **2 Channel**
TH1841-1 **4 Channel**
TH1921-1 **2 Channel**

The Celwave DCS and PCS wideband transmitter combiners are capable of coupling 1,2,3 or 4 transmitters to one antenna. This design features internal cables that are cut to the shortest length possible and the Tx filter components are silver plated to ensure low insertion loss and minimize intermodulation. In addition, these combiners have built-in single stage isolators and a VSWR alarm output with LED indicator. The alarm monitors the VSWR at the antenna output and can be remotely monitored through a customer specified interface (fx. open collector). Two separate alarm levels can be set to customer specifications.



TH1811-1

- **No min. channel separation** — Can be used to combine multiple transmitters in any frequency plan
- **Low loss** — Maximizes system performance
- **High isolation** — Minimizes transmitter IM
- **Compact** — Minimizes use of rack space.

Ordering Information

Item Number	Frequency Range - MHz	Number of Channels
TH1811-1	1805-1880	1
TH1821-1	1805-1880	2
TH1841-1	1805-1880	4
TH1921-1	1930-1990	2

ELECTRICAL SPECIFICATIONS	TH1811-1	TH1821-1	TH1841-1	TH1921-1
Number of Channels	1	2	4	2
Frequency Range* - MHz	1805-1880	1805-1880	1805-1880	1930-1990
Bandwidth - MHz	75	75	75	60
Isolation Tx - Tx, Min. - dB	40	40	40	40
Isolation ANT - Tx, Min. - dB	20	20	20	20
Insertion Loss Isolator, Max./Ch. - dB	2.2	4.6	8.6	4.6
Power Input / Ch. - Watts	45	45	45	45
Temperature Range - °F(°C)	-14 to +140(-10 to +60)	-14 to +140(-10 to +60)	-14 to +140(-10 to +60)	-4 to +131(-20 to +55)
Input - VSWR, Max.	1.2:1	1.2:1	1.2:1	1.2:1
Output - VSWR, Max.	1.7:1	1.4:4	1.7:1	1.4:1
Passband Ripple, Max. - dB	1.1	1.0	1.1	0.6
Attenuation at Rx Freq., Min. - dB	70	62	70	62
Test Coupling Loop - dB	40 ±1	40 ±1	40 ±1	40 ±1
3rd Order Intermodulation at 2 x 45 W - dBm	-	-98	-98	-98

MECHANICAL SPECIFICATIONS	TH1811-1	TH1821-1	TH1841-1	TH1921-1
Dimensions - WxHxD in.	19.0x1.7x13.7		19.0 x 3.5 x 13.7	19.0 x 1.7 x 13.7
mm.	483x44x350		483 x 88 x 350	983 x 44 x 350
Weight - lbs.(kg)	11.7(5.3)	13.23(6)	19.85(9)	13.23(6)
Connector Type - Input	N-Female			
Output	7/16 Female			

** For further information about 1,3 and 4 channel PCS and 3 channel DCS models, contact Celwave Sales Engineering.*

BDA & Amplifiers

BDA & Amplifiers

THE FOLLOWING INFORMATION IS REQUIRED WHEN PLACING AN ORDER:

BI-DIRECTIONAL AMPLIFIER

Specify beginning & end frequencies
for narrow band models (48561)
Specify "-N" for wall mount unit

TO PLACE AN ORDER:

IN NORTH AMERICA, MEXICO:

Tel: 1-800/321-4700 Fax: 1-615/641-1910

INTERNATIONAL:

Tel: 1-908/462-1880 Fax: 1-908/431-8388

TECHNICAL SUPPORT:

Tel: 800/659-1880 Fax: 1-908/462-6919

OR CALL...1-800/CELWAVE

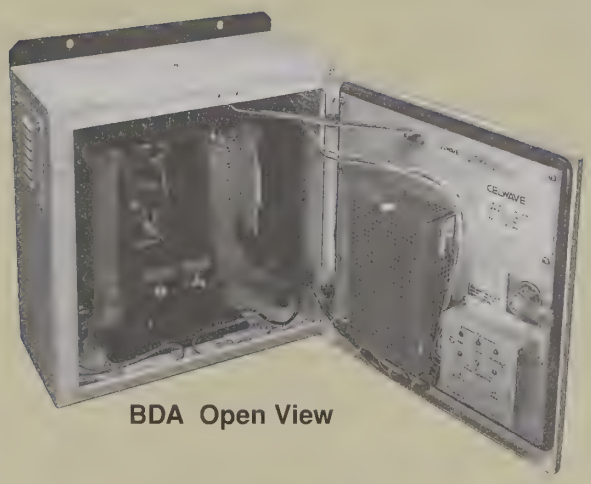
Bi-Directional Amplifier Systems

Improve coverage and profit with Celwave's cellular/SMR public safety RF repeater.

These field proven RF repeaters extend two-way duplexed RF communications into buildings, basements, parking garages and other shielded environments. System design software, a concise manual and visual diagnostics make set up fast and easy. Special circuitry assures maximum performance for 2 to 40 users and prevents runaway oscillations.

With over 20 years of RF subassembly experience, Celwave uses only proven components and thermally activated cooling to provide exceptionally high MTBF. By optimizing our BDAs for moderately weather protected areas, we provide the same power and gain performance or competitive units - at 2/3rd the cost, size and weight.

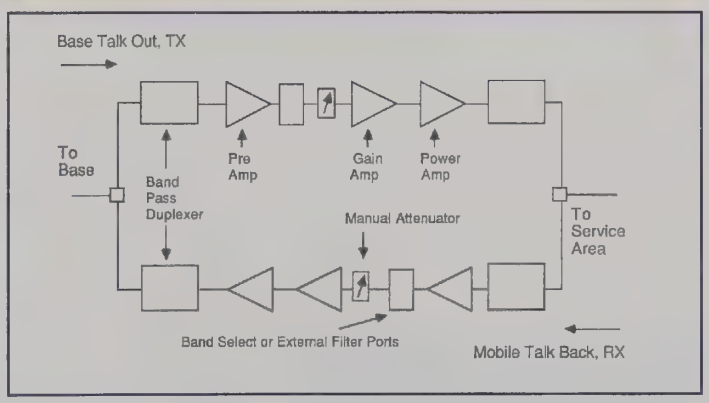
In rack or wall mount, our BDAs are space efficient for easy installation. The wall mount, with key lock, cooling and AC power supply, is just 16 x 16 x 8 inches and weighs just 50 pounds. In the event of a component failure, the visual diagnostics and user's manual troubleshooting section quickly identifies the problem. Spare parts can be shipped next day and installed with only a screwdriver.



BDA Open View

BDA Closed View

- **Bi-directional Amplifier** — Broadband, on channel, linear, duplexed RF signal boosters.
- **Broadband** — Unlimited channel capacity within the pass band.
- **On Channel** — Repeats channels without shifting the frequency.
- **Linear** — Compatible with analog and digital formats.
- **Duplexed** — Separate RF paths for base and mobile links.



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Bi-Directional Amplifier Systems

Power and IMD

Celwave built, high dynamic range amplifiers and individual BDA tuning provide optimum output power. The 6 Watt amplifier is standard, but a 1 Watt amplifier may be specified for 800/900 MHz SMRS applications, contact Sales Engineering for model number.

The usable output power is the power that can be generated while maintaining the 3rd Order Intermodulation distortion levels at or below -13 dBm (43 dB + 10 Log [Power Out]), a FCC and ISC requirement. The chart below shows the usable power per channel when the 1 Watt and 6 Watt amplifiers are used.

Each RF path is tested and set at the factory for maximum power out while meeting the -13 dBm IM level. Settings to maintain lower 3rd order IM levels are available upon request.

The output power is shared by all of the signals in the pass band. There must be adequate signal strength at the input and sufficient gain to achieve the output level shown. The formula for determining power per channel is:

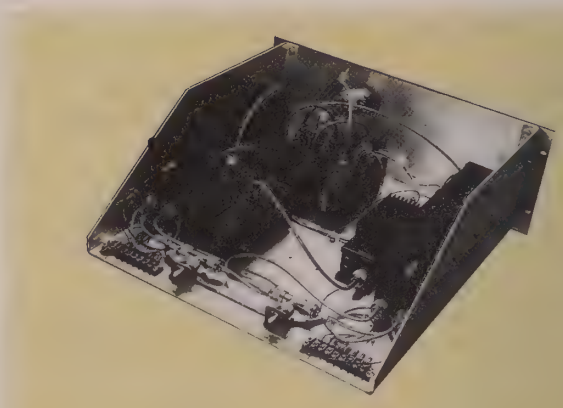
Pout – (13.29 x Log10 [number of channels])
Pout is the power for 1 signal as shown.

1 Watt Amplifier		Number of	6 Watt Amplifier	
dBm	mW	Signals	dBm	mW
25.0	316	1	30.0	1000
21.0	126	2	26.0	398
15.7	37	5	20.7	118
13.0	20	8	18.0	63
7.7	6	20	12.7	19
5.0	3	32	10.0	10
3.7	2	40	8.7	7

System Considerations

A link/site propagation analysis will determine the viability of using a RF repeater and the proper model of repeater to use. The key considerations for selecting a model are power, gain and pass band selectivity for each RF path. Other considerations include AC power, mounting space, location of antennas and cable runs.

Isolation between the donor and service area antenna should be 20 dB greater than the gain of the system to prevent gain ripples and oscillation. For example: Gain=80dB therefore isolation required ≥ 100dB. Use of a highly directional donor antenna will help provide isolation as well as increase signal strength and help attenuate undesired signals.

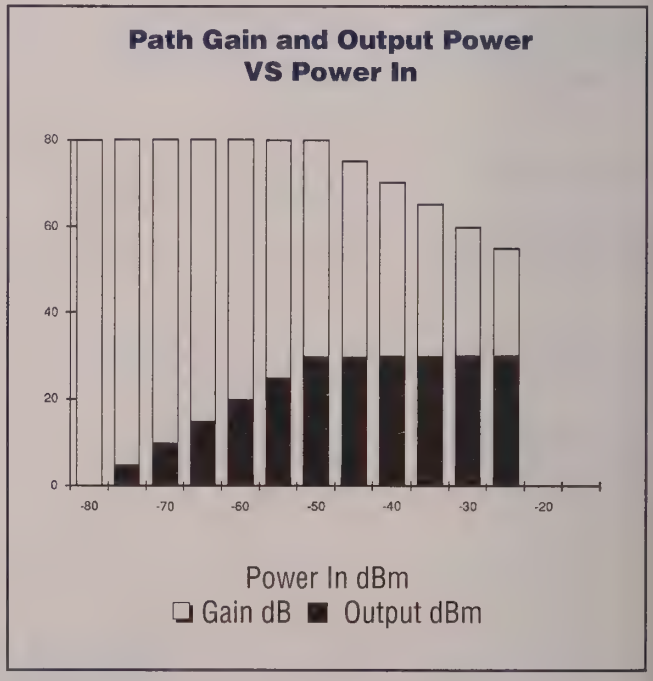


Rack mount style available

Gain and Protection

The standard BDA RF path provides 78-80 dB of gain with an optional 15 dB manual attenuator and another 25 dB of automatic gain control (AGC). The AGC circuitry is a custom designed output limiter that protects against damage from oscillations and prevents excessive intermodulatin distrortion.

If a strong input signal attempts to overdrive the amplifiers in either RF path, the AGC circuitry will reduce the gain in the path by up to 25 dB. Should the overide condition continue beyond the limiter's range, the circurity will shut down the offending path for 5 seconds and then resume normal operation. DC outputs are provided to indicate the amount of gain reduction in effect and shut down status.



Bi-Directional Amplifier Systems

Pass Band Filtering

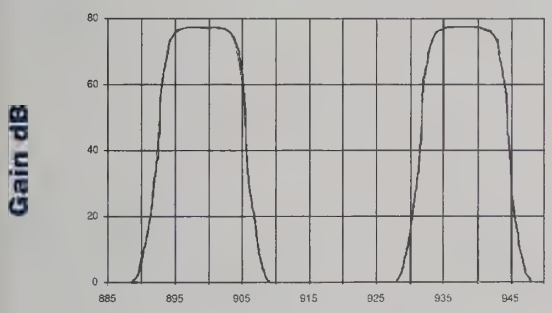
Models are available for Cellular A and B bands, 800/900 MHz SMR and Public Safety. Standard Celwave preselectors are used in duplexer configuration to provide signal direction and prevent internal oscillation (refer to block diagram). Typical pass bands for these filters are; 5, 10, 14, 18 and 22.5 MHz.

Another preselector at the output along with the gain of the amplifier chain provides a gain verses frequency response for the BDA (see graph to the left).

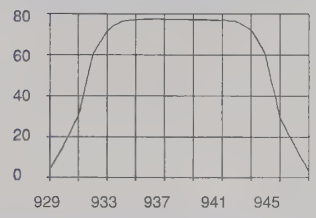
Additional band pass or notch filtering can be inserted for improved selectivity. The 48566 BDA includes an additional 3 MHz preselector in the TX path.

Enhanced Cellular BDAs, 48550-N and 48551-N, include high performance active filtering for fast roll off at the band edge. These filters provide state of the art performance at half the cost and size of conventional filtering. (See Pass Band Response Curves panel).

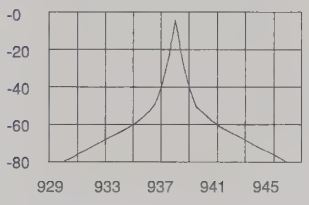
48522



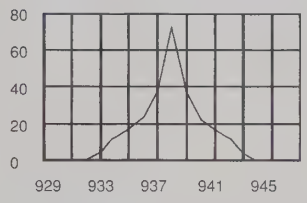
Typical Gain VS Frequency Pass Band
48522-N Base Talk Out Path



Response Curve of 2 PD500-8 Cavities
In Series at 938 MHz



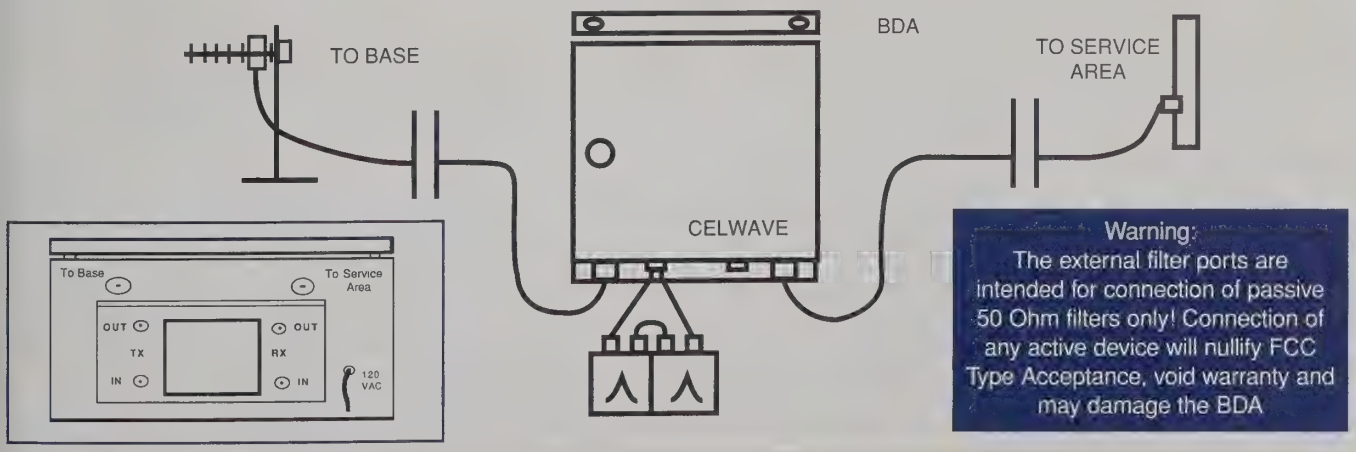
Resultant Gain VS Frequency
48522-N TX with 2 PD500-8



Diagnostics Set up and trouble shooting is easy with the Celwave BDA. Modular amplifiers are used throughout the BDA. Each amplifier is monitored for current failure and displayed via LEDs on the front panel. DC test points report temperature level, limiter activity and shut down status. Calibrated sampler ports provide in-depth performance analysis. An extensive diagnostics section in the user's manual assists in performance evaluation.

The External Filter Option

Provides the ultimate flexibility for in field pass band modification. TNC ports on the bottom of the wall package allow connection of external passive 50 Ohm filters in the TX and/or RX paths. The pass band is then modified by the performance of the external filter; see example below.



Warning:
The external filter ports are intended for connection of passive 50 Ohm filters only! Connection of any active device will nullify FCC Type Acceptance, void warranty and may damage the BDA

BDA

Bi-Directional Amplifier Systems

The standard BDA configuration includes universal 120/220VAC power supply in a wall mountable housing. See rear panel for complete Electrical, Mechanical and Environmental Specifications along with Type Acceptance. The performance specifications below are common to the models listed below in the Model Selection section. Versions of the standard models listed are available with lower power, lower gain, 24 VDC, and/or rack mountable upon request.

Typical performance at 25°C and full gain/no limiting.	**Base Talk Out**		**Mobile Talk Back**
Gain*	78-80 dB		78-80 dB
Gain Flatness	±1.0 dB		±1.0 dB
Noise Figure	5.0 dB		5.0 dB
Attenuation range, output limiter	25 dB		25 dB
1 dB Compression Pt., no limiter	+36 dBm		+36 dBm
Usable Output Power**, min.	+28 dBm	Typical +30 dBm	+28 dBm
3rd Order Output Intercept Point, IP3	+45 dBm		+45 dBm
3rd Order IM level, max.***	-13 dBm		-13 dBm
Input Power, recommended maximum, total	-26 dBm		-26 dBm
Input Power, recommended minimum, per signal	-95 dBm		-95 dBm
Impedance	50 Ohms		50 Ohms
VSWR, input, both ports	1.5		1.5
Propagation Delay	Basic = <1.0 microsecond; Enhanced = <6.0 microseconds		

Fault monitor LEDs indicate under or over current for each amplifier.
DC Test Points: AGC Voltage TX, AGC Voltage RX, Temperature, Power On TX, Power On RX.
FCC ID/ISC Number: See rear panel for individual model numbers.
*Additional band pass filtering or external filtering will reduce gain by the loss of the filter(s). Also see manual attenuator option.
**Single channel output operation. For multiple channel loading, power output per channel decreases proportionally over a 22 dB range for up to 40 channels. (See section on Power and IMD).
***BDA output power is limited via internal circuitry to assure that IM levels do not exceed -13 dBm.

Model Selection

(see Gain vs Frequency Response Curves on following page)

Description	**Model Number Wall Mount**	**Base Talk Out Frequency MHz**	**Options**	**Mobile Talk Back Frequency MHz**	**Options**	**120 VAC Current Draw Amps**
SMR Full Band	48510-N	851-869	1, 2	806-824	1, 2	1.4
SMR 5 MHz Band	48561-N	851-869	3	806-824	1, 3	1.4
Public Safety 3 MHz TX	48566-N	851-869	3, 4	806-824	1, 3	1.4
SMR 10 MHz Band	48569-N	851-869	3	806-824	1, 3	1.4
900 MHz SMR Full Band	48522-N	935-941	1, 2	896-902	1, 2	1.4
Basic Cellular A Band	48549-N	869-891.5	1, 2, 4	824-846.5	1, 2	1.4
Enhanced Cellular A Band	48550-N	869-891.5	1, 5	824-846.5	1, 5	1.6
Basic Cellular B Band	48543-N	880-894	1, 2	835-849	1, 2	1.4
Enhanced Cellular B Band	48551-N	880-894	1, 5	835-849	1, 5	1.6

Options Key

1. Manual 15 dB Attenuator included. **2.** External Filter Option included. **3.** Specify Frequency Range with Order.
4. Internal Filtering, Gain -1.5 dB from max. **5.** Internal Down Convert Filter. Prop Delay <6.0 µs, NF <9.0 dB.

For BDA's ordered outside the US and Canada, a compatible power cord must be specified, as follows:

Region	**Standard**	**Countries Used In**	**Part Number**
Continental Europe	CEE 7/7	Germany, Austria, Norway, Sweden, Finland, Netherlands, Belgium, France Portugal, Spain, N. Africa, the Middle East, Brazil and Argentina.	J17204
UK	BS1363	United Kingdom, Ireland, Singapore	J17200
Denmark	Afsnit 107-2-01	Denmark only	J17205
Israel	SI 32	Israel only	J17206
India	BS546	India only	J17207
Italy	CEI 23-16/VII	Italy, Parts of North Africa	J17208
Switzerland	SEV 1011	Switzerland only	J17209
Australia	AS 3112	Australia, New Zealand, Fiji, Papua New Guinea. Also, the Peoples Republic of China Standards GB 1002, GB 1003-80 and GB 20990-80	J17210
US*	Nema 5-15P Nema 6-15P	USA, Canada, Mexico, Japan, parts of Korea, Taiwan, Central America, west coast South America	J17201

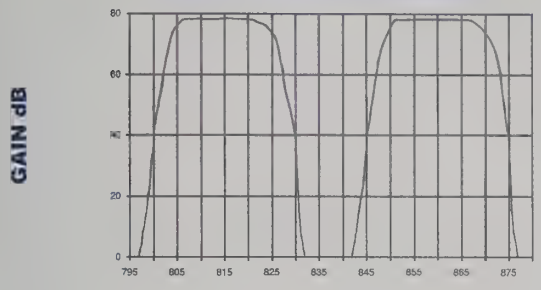
*Note: The standard BDA model is supplied with a power cord (8ft.) with a US type plug.

Bi-Directional Amplifier Systems

Pass Band Response Curves

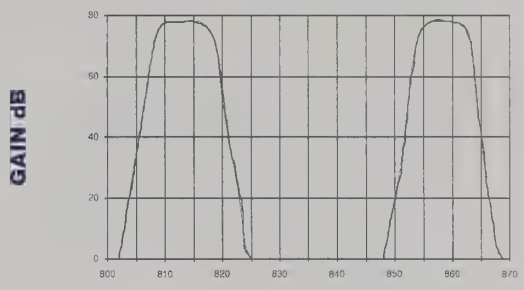
Typical gain vs. frequency response curves for the Base Talk Out (Tx) and the mobile talk back (Rx) paths

48510 Full Band SMR



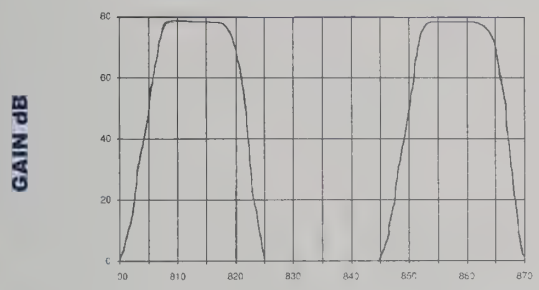
FREQUENCY MHz

48561 813/858 MHz CF



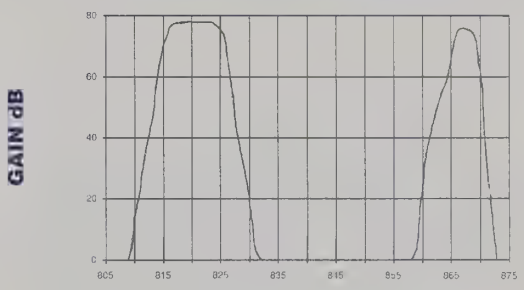
FREQUENCY MHz

48569 813/858 MHz CF



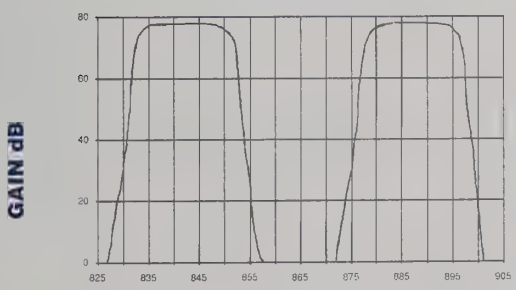
FREQUENCY MHz

48566 820/867 MHz CF



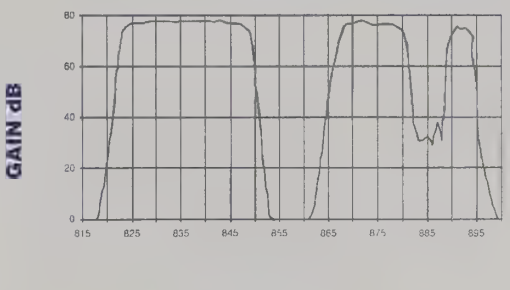
FREQUENCY MHz

48543 Basic B Band Cellular



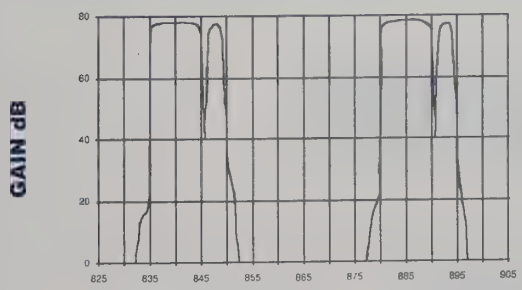
FREQUENCY MHz

48549 Basic A Band Cellular



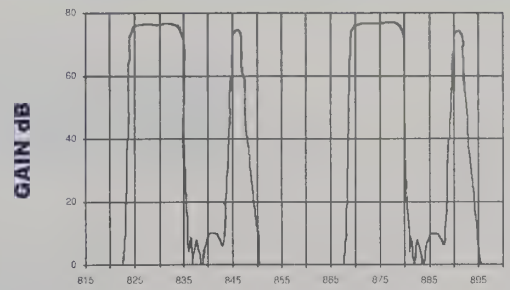
FREQUENCY MHz

8551-N Enhanced B Band Cellular



FREQUENCY MHz

48550-N Enhanced A Band Cellular



FREQUENCY MHz

Bi-Directional Amplifier Systems

Electrical Specifications	Basic	Enhanced
22-28VDC Full Performance BDA	5.2 Amps	5.7 Amps
110VAC ±10% @ 60Hz ± 2%	1.4 Amps	1.6 Amps
220VAC ±10% @ 50Hz ± 2%	.7 Amps	.8 Amps

Mechanical Specifications	
Dimensions: W x H x D–in. (mm)	19 x 7 x 18-1/8 (482.6 x 177.8 x 460.4)
Power Supply	AC
Rack Mount	EIA 19" Standard
Wall Mount Enclosure: W x H x D–in. (mm)	16 x 16 x 8 (400 x 400 x 200)
Approximate Weight–lbs.	
Rack Mount	30
Wall Mount	50
Connectors, Input and Output	Type N, Female

Environmental Specifications	
Operating Temperature:	-30 to +60°C
Humidity:	Relative up to 95% (non condensing)
Wall Mount Enclosure Rating:	Similar to NEMA 3R

Note: Operation at case temperatures over 55°C should be limited to 200 hours per year.Operation over +75°C will void warranty.

Type Acceptance

Celwave BDAs have been type accepted by the FCC and certified by the ISC for operation in Cellular, SMR and Public Safety bands under the ID/Certification numbers listed below.

FCC ID Number	ISC Certification Number
IWD BDA48500-505	1634 B9444
IWD BDA48506-511	1634 B9445
IWD BDA48512-517	1634 B9436
IWD BDA48518	1634 B9435
IWD BDA48540-550	1634 B211
IWD BDA48550-N	1634 182188C
IWD BDA48551-N	1634 B267

WHEN ORDERING:
Specify beginning and end frequencies for narrow band models (48561). Specify "-N" for wall mount unit.

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Low Power, Class A Linear, RF Amplifiers

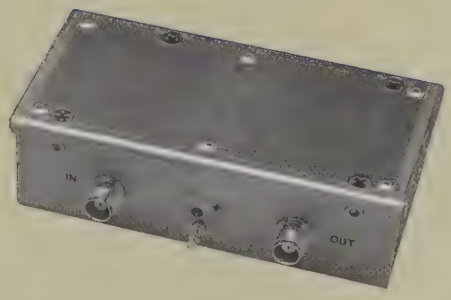
PF782	66-88	MHz
PF9208A	136-174	MHz
PF892B	175-225	MHz
PF865	30-400	MHz
PF829	406-512	MHz
PF869E	406-512	MHz
PF884A4	450-470	MHz
PF861E	806-920	MHz
PF833	806-920	MHz
PF805H	806-920	MHz
PF845G*	806-824	MHz
PF849F*	824-849	MHz

* Models available in band widths of 30 MHz for SMR, AMPS and GSM bands.

The PF series solid state RF amplifiers are designed and optimized for receiver multicoupler and signal distribution use in standard communication bands.

Standard models are shown here. For OEM applications, custom models can be provided with: built-in attenuator, fault alarm, automatic gain control and/or custom packaging. Contact Celwave Sales Engineering.

- **Proven Reliability**
- **Unconditional Stability**
- **Lightning Protection**
- **Guaranteed Performance**



PF845

PF849

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Low Power, Class A Linear, RF Amplifiers

ELECTRICAL SPECIFICATIONS	PF782	PF9208A	PF892B	PF865	PF829	PF869E	PF884A4	PF861E	PF833	PF805H	PF845G*	PF849F*
Basic Type**	SB	QB	QB	PB	QB	QB	QG	QB	QB	SB	QG	QG
Frequency Range - MHz	66-88	136-174	175-225	30-400	406-512	406-512	450-470	806-920	806-920	806-920	806-824	824-849
Nominal Gain - dB	16.5	16.5	16.5	16.5	16.5	18.5	16	16.5	26.5	10-32	18.0	16.0
Noise Figure - Max. dB	5.0	3.8	5.0	5-8	4.5	2.8	1.0	2.8	2.8	2.8	1.7	1.0
Comp Point - Typ dBm	24	20	22	23	24	20	12	20	24	23	24	12
IP3 Output - Min dBm	35	34	34	35	38	30	20	32	34	36	35	20
VSWR - Max.	2.0	1.5	1.35	2.0	1.5	1.5	1.4	1.5	1.5	2.0	2.0	1.4
Power VDC	20	11-26	18-28	20	20	11-15	11-20	11-15	20	18-30	20-30	18-30
mA - Nom.	160	160	160	150	160	70	40	70	275	210	225	35
Gain Flatness - Typ dB	±0.5											
Impedance - ohms	50											
Temperature Range - °C	-40 to +60											

***Models available in band widths of 30 MHz for SMR, AMPS and GSM bands.**

**Basic Type Key: S= Single ended P= Push-pull Q= Quadrature B=Bipolar devices G=GaAsFET devices

MECHANICAL SPECIFICATIONS	PF782	PF9208A	PF892B	PF865	PF829	PF869E	PF884A4	PF861E	PF833	PF805H	PF845G*	PF849F*
Connectors	BNC and solder pins for +VDC and Gnd.											
Package Size - in. (mm)	1.5 x 5.25 x 2.55 (38 x 133 x 65)											
Mounting - in.	4 each 6/32 inserts, 1.75 x 4.75											
Weight - lbs. (kg)	1.00 (0.45)											
Package	Folded sheet metal box, painted black											

***Models available in band widths of 30 MHz for SMR, AMPS and GSM bands.**

In addition, all models:
1. Are tested for min/max specifications at room temperature.
2. Have surge protection on DC power line.
3. Include data sheet with test measurements.

Accessories
- DC-2, DC Block: DC power feed on coax with RF signals, 406-512 MHz and/or 806-960 MHz, DC line surge protection included.
- PD Series, Power Dividers: Low power, high isolation, splitters with 2 to 12 outputs.
- AT882/883, Pin Diode Variable Attenuators: Manual or VDC controlled from 1 to 30 dB, for use from 5 to 1000 MHz, BNC connectors, .75 x 1.70 x 1.24", requires power 15 to 20 VDC @ 25 mA.

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High Power, Class A Linear, RF Amplifiers

PA901	800-960	MHz
PA9142	800-960	MHz
PA9340	800-960	MHz
PA9341	800-960	MHz
PA9148	800-960	MHz
PA9144	800-960	MHz

Models available in band widths of 25 to 60 MHz .

The PA series solid state RF amplifiers are designed and optimized for Cellular, SMR and GSM repeater applications in standard communication bands.

Standard models are shown here. For OEM applications, custom models can be provided with: built-in attenuator, fault alarm, automatic gain control and/or custom packaging. Contact Celwave Sales Engineering.

- **800/900 MHz Bands**
- **Up to 50 Watts Out**
- **Proven Reliability**
- **Unconditional Stability**

PA9340

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High Power, Class A Linear, RF Amplifiers

ELECTRICAL SPECIFICATIONS	PA901	PA9142	PA9340	PA9341	PA9148	PA9144
Frequency Range - MHz*	800-960	800-960	800-960	800-960	800-960	800-960
Gain - Min. dB	25	30	32	30	8.5	16
Gain Flatness - Typ. dB	±0.5	±1.0	±0.7	±0.7	±0.5	±0.7
Noise Figure - Max. dB	3.5	9.0	7.0	9.0	N/A	N/A
Comp Point - Watts	1	2.5	6	10	25	50
- Typ. 1 dB	+30 dBm	+34 dBm	+38 dBm	+40 dBm	+44 dBm	+46.5 dBm
Intercept Point - Min.	+40 dBm	+43 dBm	+46 dBm	+48 dBm	+51 dBm	+56.5 dBm
- Typ.	+41 dBm	+45 dBm	+47 dBm	+50 dBm	+52.5 dBm	+57 dBm
VSWR - Input Typ.	1.5	2.0	2.0	2.0	1.5	1.5
Voltage - DC	20-28	20	23-30	20	20	20
Current - Max.	425 mA	1.2 Amps	2.2 Amps	3.5 Amps	5.2 Amps	14.5 Amps
Impedance - Ohms	50					
Temperature Range - °C	-40 to +50					

**Models shown above are basic configuration. Bandwidth is limited to 25 MHz 0n most models. Suffix letters specify frequency band and options. Contact Sales Engineering for assistance in determining the model number.*

MECHANICAL SPECIFICATIONS	PA901	PA9142	PA9340	PA9341	PA9148	PA9144
Connectors	N-Female and solder pins for +VDC and Gnd.					
Size - (not incl. connectors) in. (mm)*						
Height	1.50 (38.1)	1.90 (48.3)	1.90 (48.3)	1.90 (48.3)	2.00 (50.8)	4.80 (121.9)*
Width	5.25 (133.3)	6.90 (175.3)	6.90 (175.3)	6.90 (175.3)	4.72 (119.9)	7.70 (195.6)
Depth	2.55 (64.8)	2.10 (53.3)	2.10 (53.3)	2.10 (53.3)	2.10 (53.3)	6.30 (160.0)
Weight - lbs. (kg)	1.0 (.45)	1.5 (.68)	1.5 (.68)	1.5 (.68)	4.0 (1.8)	8.0 (3.60)

**Heat sink included on this model, for all other models, heat sink is not included. Mounting amplifiers to an adequate heat sink is required such that the case temperature does not exceed 50°C at all ambient conditions for continuous operation, 70°C short term.*

In addition, all models:

1. Are tested for min/max specifications and stability at room temperature.

2. Have surge protection on DC power line.

3. Include data sheet with test measurements.

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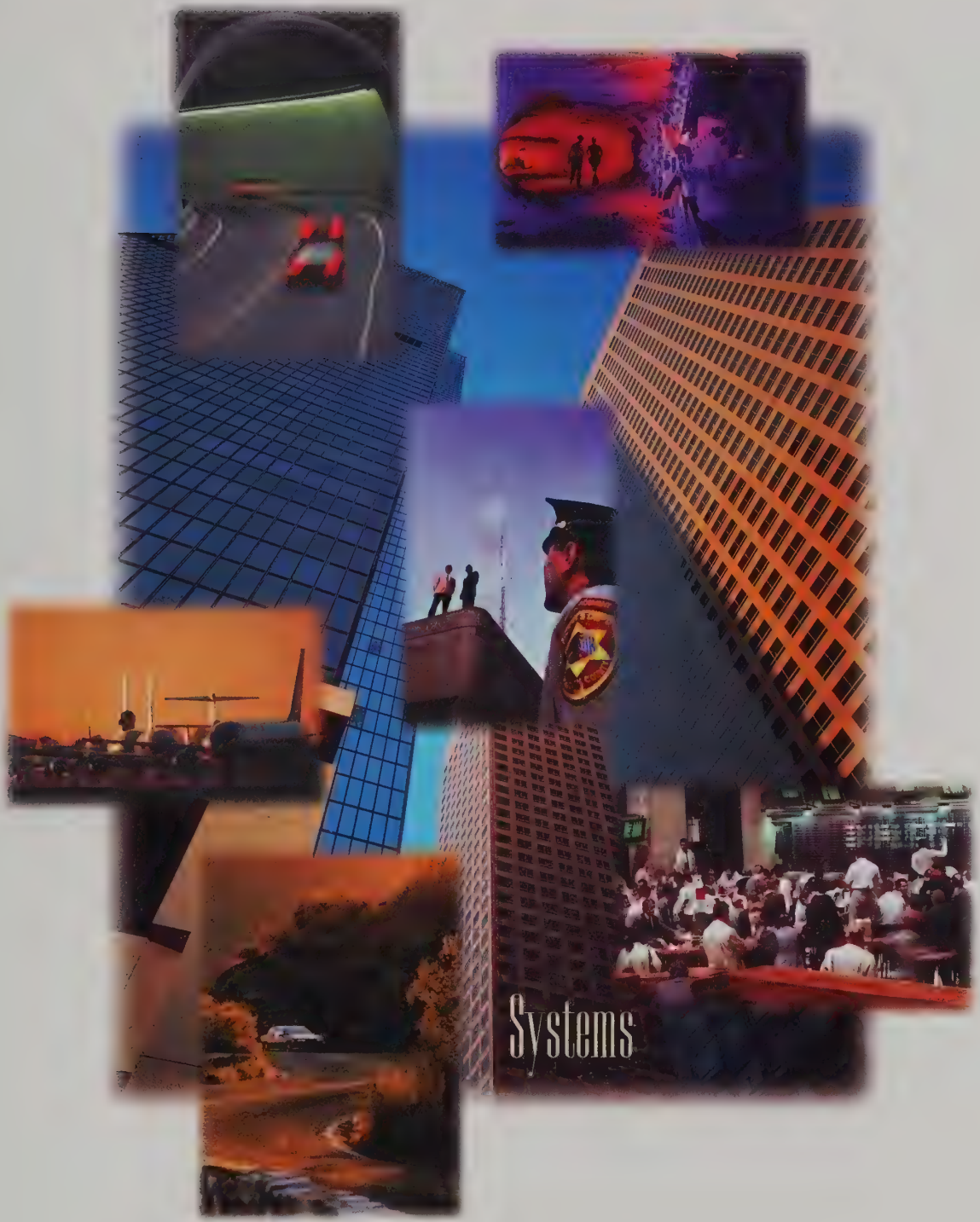

Systems

Systems

THE FOLLOWING INFORMATION IS REQUIRED WHEN PLACING AN ORDER:

SYSTEMS...

Specify Transmit & Receive frequencies where applicable.

TO PLACE AN ORDER:

IN NORTH AMERICA, MEXICO:

Tel: 1-800/321-4700 Fax: 1-615/641-1910

INTERNATIONAL:

Tel: 1-908/462-1880 Fax: 1-908/431-8388

TECHNICAL SUPPORT:

Tel: 800/659-1880 Fax: 1-908/462-6919

OR CALL...1-800/CELWAVE

Duplexed Trunking System

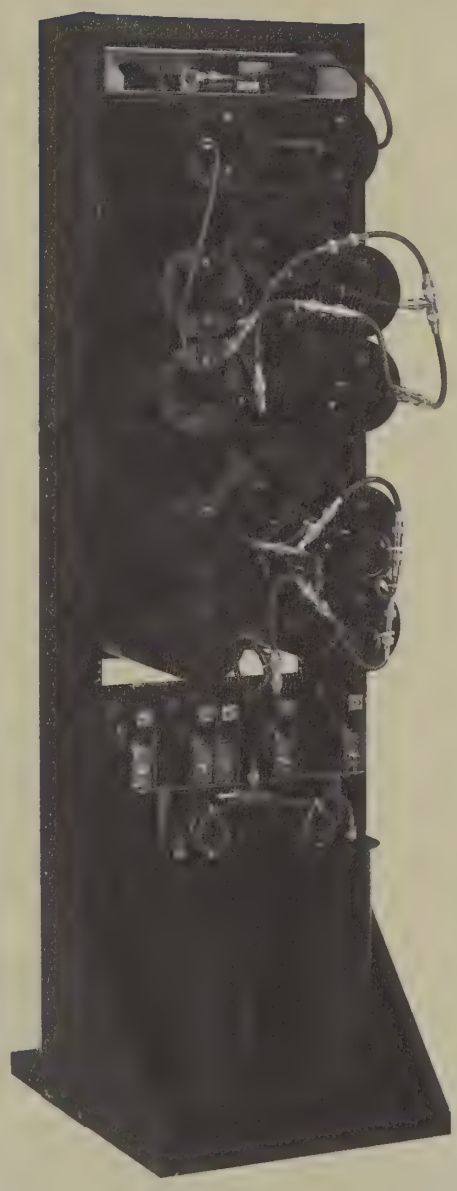
PD719110 220 MHz

This integrated system is designed for close frequency spacing while maintaining superb frequency stability for 200 MHz trunking applications. This fully duplexed trunking system serves several functions that allow two or more transmitters to be combined into a single coax, provides isolation between transmitters, and provide filtering against intermodulation and potential interference.

The PD719110 trunking system consists of a TJD220-5T Trunking Combiner, Duplexer, 2-Pole Receive Filter, and a Receiver Multicoupler. The TJD220-5T Transmitter Combiner employs a combination of ferrite isolators and cavity resonators to obtain low insertion loss and high isolation between transmitters. This combiner has two isolators per channel and 5 channels for use in the 220 MHz trunking band. The minimum channel spacing at which this unit is used is 150 KHz at 220 MHz.

The receive portion of the Duplexer consists of six PD1604B cavities used as resonators mounted on a 15 3/4" x 19" panel. The 2-Pole Filter consists of two PD1604B cavities on a 7" x 19" panel. The Tx portion of the Duplexer also consists of six PD1604B cavities on a 15 3/4" x 19" Panel. The RMC Tray contains an amplifier, power divider, and a power supply.

- **OEM tested** Approved and endorsed.
- **High isolation** Minimizes IM potential.
- **Factory integrated** For most efficient operation.
- **Copper construction** Provides frequency stability.
- **Low insertion loss** For maximum ERP.
- **Field expandable** To 10, 15 or 20 channels.
- **High power** 100 watts avg. power input capability.



PD719110

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Duplexed Trunking System

ELECTRICAL SPECIFICATIONS	PD719110 - 5 channels
Frequency Range - MHz	220-222
Tx Passband - MHz	220-220.6
Return Loss (Typ.) - dB	>14.0
Rx Passband - MHz	221-221.6
Return Loss (Typ.) - dB	>14.0
System Noise Figure	6.8 dB @ 221 MHz
Isolation, Tx Attenuation @ Rx Freq. - dB	>85
Isolation, Rx Attenuation @ Tx Freq. - dB	>75
Attenuation @ 211.25 MHz	>48.0
Rx Multicoupler Gain	6.0 dB @ 221 MHz
System Gain @ 221 MHz (Typ.) - dB	3.6
System Gain @ 221.6 MHz (Typ.) - dB	4.7
Insertion Loss (Typ.) - dB	4.5
Insertion Loss (Max.) - dB	5.1 @ 220.6 MHz
Tx Input Return Loss - dB	>19.0
Average Power Input/Channel - Watts	100

MECHANICAL SPECIFICATIONS	PD719110 - 5 channels
Height - in. (mm)	68.25(1733.5)
Width - in. (mm)	19.0 (482.6)
Depth - in. (mm)	24.0 (609.6)
Weight - lbs. (kg)	289 (129.4)

Other models available

Item Number	Features
719650	5 channel, separate Tx and Rx
719870	10 channel, full duplex and trunking system

Contact Sales Engineering for additional information

WHEN ORDERING:
Specify Transmit and Receive frequencies where applicable.

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RSA Amplifier-Combiner System

The Celwave RSA Amplifier Rack is an assembly consisting of 8 amplifiers and an SJD880-8 combiner. This system has 8 amplifiers that extend the transmitter range of a typical eight-transmitter MSA site to cover the larger RSA cells. All amplifiers are FCC type accepted 175-Watt Class-C amplifiers with built-in low pass filter and dual isolators.

The SJA880-8 series of amplifier racks include an SJD880-8 combiner with "barbell" heat sinks built-in to improve the reliability of the combiner. The special modification is needed because the combiner is subjected to power levels over and above normal cellular MSA power levels.

- **Total vertical rack space (includes Tx filter, combiner and amplifiers)** 63 inches.
- **Power available at output of bandpass filter** 105 Watts/ channel minimum.
- **Input power for rated power** 1 Watt/channel nominal.
- **Current drain for rated power at 26.4 VDC** 20 AMPS/ amplifier typical.
- **Redundant amplifier for signaling channel**

SYSTEM SPECIFICATIONS

Frequency Range - MHz	869-894
Bandwidth - MHz	25
Isolation, min. Tx-Tx - dB	65
Isolation, min. Ant.-Tx - dB	52
Reflected Power, max. Allowable From Ant. - Watts	150
Channel Separation, For Specs Given - MHz	0.63
Temperature Range - °F (°C)	$^{-}$22 to $^{+}$140 ($^{-}$30 to $^{+}$60)

MECHANICAL SPECIFICATIONS

Width - in. (mm)	19 (483)
Height - in. (mm)	63 (1600)
Depth - in. (mm)	18-1/2 (470)
Connectors	Input - TNC Output - LC

RSA Amplifier-Combiner System

Options available

F-Option includes a 5192-LBK transmitter filter which increases the isolation between the transmitter/receiver and increases the isolation between the RSA site and other services on the same nearby sites.

R-Option includes a hot standby amplifier and relay switch.
X-Option includes two extension cables instead of a junction.

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High Power Amplifier

High Power Amplifier

The high power, class C amplifier is specially designed for continuous duty radio applications. High reliabilty is assured by conservative operation of all devices and by use of redundant circuitry. A dual isolator and low pass filter provides for transmitter protection, IM reduction and harmonic filtering.

- **Double quadrature coupling** Maintains over 85 Watt output with 1 failed output transistor.
- **Conservative operation** 225 Watt transistor capability.
- **Fully regulated power for all stages for high reliability**
- **Temperature monitoring with automatic power reduction and shutdown**
- **Programmable power control**
- **Fully shielded construction with RFI gasketing**
- **Self-contained air cooling system**
- **Compact** Half-rack size.

Amplifier

SPECIFICATIONS

Frequency - MHz	869-894
Power Output, continuous*	175 Watts
Power Adjustment	To 75 Watts
Power Input, For Full Output	.7 to 1.5 Watts
Duty Cycle	Continuous
Harmonic and Spurious Output, 175 Watts Output	Below -43 dBW
Input VSWR, max.	2.0
Output VSWR	1.3
Stability with Source and Load Impedance	Unconditional
Maximum Load VSWR	∞
Operating Voltage	21 to 31 VDC
Output at Reduced Voltage, min.	25 VDC; 150 Watts 23 VDC; 125 Watts 21 VDC; 100 Watts
Current For 175 Watts, 26.4 VDC, max. Including Fan	25 Amp
Current for Maximum Output at 21.0 VDC, Max.	27 Amp
Operating Ambient Air Temperature	-30 to +60 °C
Alarm Outputs, TTL (Low for No-Fault):	Over Temperature Low RF Power Output
Status Output	Drive Power Present
Power Reduction For Over Heat	To 85 Watts
Temperature For Power Reduction	75±5 °C
Temperature For Power Shutdown	85±5 °C
Fan Cooling	Built In
Alarm Outputs	DE9

*This power rating assumes 0.6 dB of loss in the isolator assembly. This corresponds to generated power of 200 Watts at the isolator input.

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CELWAVE DISTRIBUTED COMMUNICATIONS SYSTEMS

Our New Service: Your New Horizons

In an ideal world there would be no hostile rf environments... environments that impede transmission and reception.

But hostile rf environments abound. Mines. Tunnels. Underground garages. Basements. Skyscrapers. Seagoing vessels. Prisons. Campuses. Airports.

What' s more, every situation... every barricade to effective communications... is unique. What solves a communications problem in one tunnel is unlikely to do so for the next. What works for two floors of this high-rise may be unsuitable for another.

There is, however, one characteristic that hostile rf environments have in common: Each demands a customized, carefully engineered system in order to enjoy smoothly functioning communications.

We provide such systems. For voice. For data.

We're Celwave Distributed Communications Systems (DCS), a dramatic, full-service response to the needs of the land mobile radio industry.

Celwave DCS provides everything you need to overcome your next environmental rf challenge.

We provide a system designed expressly for you.

And we will ensure that your customized turnkey system will perform precisely as engineered.

Celwave DCS: A New Dimension In Services

Worldwide, rf communications has benefited from the advanced design and consistent performance of Celwave equipment... transmitter combiners, filtering and isolation devices, directional and omni antennas, rf amplifiers, and more.

Now you can profit from our new dimension in capabilities and service: Celwave DCS.

Celwave DCS offers systems solutions for virtually the entire gamut of rf communications: PCS, cellular, land mobile communications, marine, paging.

That means there's simply no need to stretch your own staff resources when you confront a hostile environment. Instead, call on Celwave DCS, with its staff of world-class engineers and design specialists.

With Celwave DCS, you define the problem... you establish performance levels... you stipulate the DCS services you need, and those you don't.

We do the rest.

We expand your current system or design a new one, including components from other major manufacturers, if needed... spec all equipment... install it at your request... conduct system testing... give you complete system documentation... and train your people until they're comfortably proficient.

In brief, we tailor-make a system that solves your particular problem cost-effectively.

And we guarantee the results.

Our People Are Your Best Assurance

Celwave DCS personnel are your best assurance of complete satisfaction. Backed by Celwave's worldwide logistical support, Celwave DCS comprises highly experienced engineers adept at systems application and integration. They've managed projects-from broadcast bands to microwave bands-worldwide.

Based at our Phoenix, Arizona, facility, these rf experts and support staffers have hands-on experience in a wide variety of projects, including:

- Frequency planning and system optimization
- Cellular integration
- Repeater and rf links engineering
- Antenna selection and modification
- RF Power budget analysis
- Site supervision
- Talk-out/talk-in balancing
- rf penetration criteria for buildings and subterranean sites
- Radiating cable and antenna distribution schemes
- OEM systemized schemes and subsystem designs

There are few rf problems that these enterprising professionals haven't met. And solved.

And they would welcome the opportunity to apply their expertise the next time you're roadblocked by a communications environment that calls for "just the right system."

It's Easy To Get The System You Need

It's easy to get the system you need. To solicit a project bid from Celwave DCS, just contact us at 602-252-8058. Or mention your project to your Celwave representative or distributor.

It's that simple.

And the result will be a system that suddenly makes your hostile environment seem very friendly, indeed.

Celwave DCS serves you with a wide-ranging spectrum of specialties. Among them:

- Distributed/radiating cable schemes
- In-building coverage
- RF combining and multicoupling
- Shadowed and depression terrain soluti
- Tower amplifiers/talkback balancing
- Antenna diversity configurations
- Monitoring/alarms/reporting

Celwave DCS performs a multitude of functions that can contribute to the success of your next project. Among them:

- RF transmission line sizing
- Field studies/inspections
- Connectorization and splicing
- Intermodulation and RFI evaluations
- Electrical grounding/transient voltage protection
- RF power budget analysis
- Redundancy configurations
- Transportation/consolidation
- Product Integration
- Systems Documentation
- Installation or supervision only... your ch

DCS CELWAVE

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Phoenix, Arizona 85004-2929
602/252-8058 • Fax 602/256-2632

System
Components
REVERSE
FORWARD

System Components

TO PLACE AN ORDER:

IN NORTH AMERICA, MEXICO:

Tel: 1-800/321-4700 Fax: 1-615/641-1910

INTERNATIONAL:

Tel: 1-908/462-1880 Fax: 1-908/431-8388

TECHNICAL SUPPORT:

Tel: 800/659-1880 Fax: 1-908/462-6919

OR CALL...1-800/CELWAVE

Power Monitor/Directional Coupler

Guardian Series
DCG1*, DCG2*

***Exact frequencies must be specified. See Ordering Numbers on next page.**

Celwave's Guardian Power Monitors measure transmitter output power, antenna forward power, antenna reflected power, and VSWR.

Fully programmable, the Guardian allows you to program alarm levels for individual channel low power levels and individual antenna high VSWR with a 15-button keyboard. A 16-character LCD display permits on-site monitoring of the selected transmitter or antenna.

Model #507400 monitors up to 5 transmit channels and 1 antenna. Three additional models are available to suit your system configuration – up to 20 transmit channels and 4 antennas.

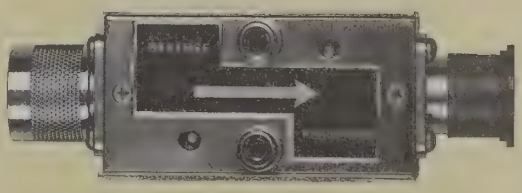
A single directional coupler (DCG1) is required for each transmit channel; a dual directional coupler (DCG2) for each antenna connection. Both couplers are available from 66 to 1000 MHz. To order, contact our Customer Service Department.

- **Fully programmable** — Allows programming of alarm levels for up to 20 channels and antennas.
- **LCD display** — Permits on-site monitoring.
- **Multi-measurements** — Measures transmitter output power, antenna reflected power and VSWR.

GUARDIAN
POWER MONITOR

507400

DCG1



DCG2

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Power Monitor/Directional Coupler

SPECIFICATIONS	ALL MODELS
Frequency Range - MHz	66-1000
Display	
Actual Power	Resolution
to .1 of Watt	0.1-9.9W
to 1 Watt	10-500W
VSWR	1.00-9.99
Accuracy (with Couplers)	
Transmit Power 0.1-4.9W	±0.5W
Transmit Power 5.0-250W	±5%
Antenna Forward Power 5.0-250W	±10%
VSWR (with Antenna Forward Power >.5W)	±10%
Programmable Levels	
Transmit Power	0-250W
VSWR Alarm	1.00-3.50
Number of Antennas	1-4
Number of Transmitters	1-20
Dimensions - W x H x D (Minus Cables)	19" x 5.25" x 11"
DC Power Supply	10-14 VDC at 1.5 amps

GUARDIAN POWER MONITOR

Ordering Information - Power Monitor

Item No.	Total Antennas	Total Transmitters	Configuration
507400	1	5	1Ax5T
507390	2	10	2Ax5T 1Ax10T
507380	3	15	3Ax5T 1Ax10T + 1Ax5T 1Ax15T
507370	4	20	4Ax5T 2Ax10T 4Ax15T + 1Ax5T

A= Maximum number of Antennas. T= Maximum number of Transmitters.

Ordering Information - Directional Coupler

Item No.	Frequency Range - MHz
DCG1-070	66-88
DCG1-150	132-174
DCG1-460	406-512
DCG1-800	800-1000
DCG2-070	66-88
DCG2-150	132-174
DCG2-460	406-512
DCG2-800	800-1000

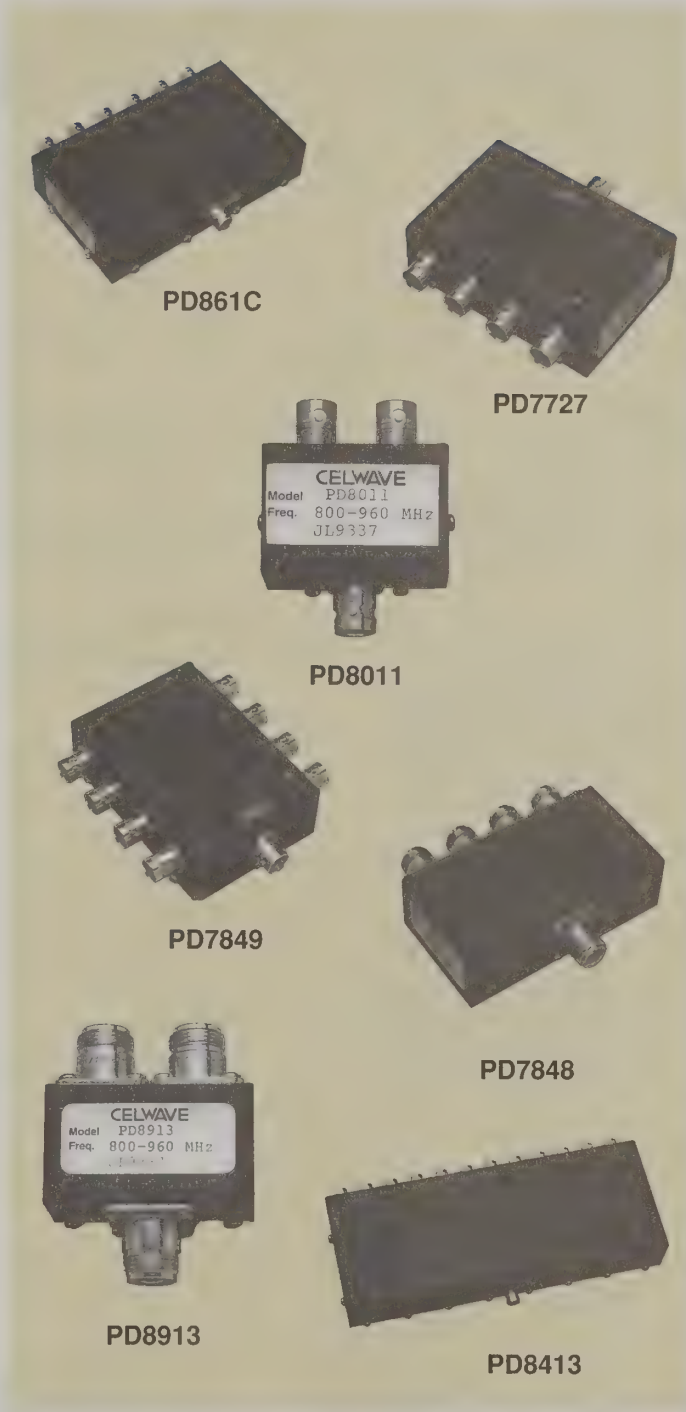
Low Power, Isolated Power Dividers

PD872	2-520	MHz
PD7724	20-512	MHz
PD7722	20-512	MHz
PD7725	20-512	MHz
PD7726	20-512	MHz
PD867A	450-512	MHz
PD8011	800-960	MHz
PD8913	800-960	MHz
PD7727	800-960	MHz
PD7848	800-960	MHz
PD861C	800-960	MHz
PD7849	800-960	MHz
PD834E	806-821	MHz
PD8413	806-920	MHz

The PD series high performance RF power dividers are designed and optimized for receiver multicoupler and signal distribution use in standard communication bands.

Standard model specifications are listed. For OEM applications, models can be provided with custom performance and/or custom connector and package configuration. Contact Celwave Sales Engineering.

- **Proven Reliability**
- **High Isolation**
- **Divider or Combiner Use**
- **Guaranteed Performance**



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Low Power, Isolated Power Dividers

ELECTRICAL SPECIFICATIONS	PD872	PD7724	PD7722	PD7725	PD7726	PD867A	PD8011	PD8913	PD7727	PD7848	PD861C	PD7849	PD834E	PD8413
Outputs	2	2	4	4	8	12	2	2	4	4	6	8	10	12
Frequency Range - MHz	2-520	20-512	20-512	20-512	20-512	450-512	800-960	800-960	800-960	800-960	800-960	800-960	806-821	806-920
Isolation - Min. dB	25													
VSWR - Max.	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.50	1.35
Insertion Loss* - Max. dB	1.0	1.0	1.5	1.5	2.0	1.5	0.6	0.6	0.8	0.8	0.6	1.5	1.5	1.5
Amp. Bal. - Typ. dB	0.2	0.2	0.3	0.3	0.4	0.5	0.2	0.3	0.3	0.3	0.3	0.8	0.3	0.5
Input - Max. watts	2													
Impedance - Max. ohms	50													
Temperature Range - °C	$^{-}$40 to $^{+}$60													

***Does not include splitter loss of 10Log N, where N equals the number of channels.**

MECHANICAL SPECIFICATIONS	PD872	PD7724	PD7722	PD7725	PD7726	PD867A	PD8011	PD8913	PD7727	PD7848	PD861C	PD7849	PD834E	PD8413
Connectors	N	BNC	N	BNC	BNC	BNC	BNC	N	BNC	N	BNC	BNC	BNC	BNC
Package Type (see below)	1	1	1	1	2	1	1	1	1	1	1	2	1	1
Package Dimensions (see below)	B	A	D	C	C	G	A	B	C	D	E	C	F	G
Weight - lbs. (kg)	0.5 (.23)	0.2 (.09)	1.0 (.45)	0.5 (.23)	0.5 (.23)	1.8 (.82)	0.2 (.09)	0.5 (.23)	0.5 (.23)	1.0 (.45)	.75 (.35)	0.5 (.23)	1.5 (.68)	1.8 (.82)

PACKAGE TYPE **1= Input on width face opposite from outputs.**
2= input on depth face, outputs split on opposing sides of width face.

PACKAGE DIMENSIONS	Size = Hx W xD (inches)	Inserts, Mntng. Cntrs.
A	0.85 x 1.70 x 1.24	4 @ 4/40, 1.12 x 0.75
B	1.15 x 2.20 x 1.27	2 @ 6/32, 1.50
C	1.05 x 3.25 x 2.25	4 @ 4/40, 1.50 x 2.50
D	1.40 x 4.37 x 2.31	4@ 6/32, 3.40 x 1.50
E	1.10 x 5.00 x 3.00	4 @ 4/40, 2.00 x 4.00
F	2.56 x 7.48 x 3.41	4 @ 4/40, 1.90 x 5.80
G	1.45 x 9.25 x 3.50	4 @ 6/32, 2.50 x 7.50

In addition, all models:
1. Are tested for min/max specifications at room temperature.
2. Connector spacing 0.75" = BNC, 1.00" = N.

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System Cabinets and Accessories

PD543860 Open Rack
This vertical stacked open rack is used to mount transmitter combiner/receiver multicoupler systems and radio equipment. It measures 64-5/8 inches (1641 mm) high overall with base dimensions of 20-7/8 inches (530 mm) by 26 inches (660 mm) and weighs 80 lbs. (36.3 kg). Available rack space is 61-1/4 inches (1556 mm). Set of 4 casters optional, specify #044855900.

PD543740 Open Rack
This open rack is similar to the PD543860 except it measures 73-3/8 inches (1864 mm) high overall with available rack space of 70 inches (1178 mm). Net weight is 89 lbs. (40.4 kg). Set of 4 casters optional, specify #044855900.

044853900 Caster Kit
Set of 4 casters and mounting hardware for PD543860 and PD543740.

PD543000 System Cabinet
These upright steel cabinets provide protection and security for transmitter combiner/receiver multicoupler systems as well as radio equipment. They measure 70 inches (1778 mm) high, 22 inches (559 mm) wide and 22 inches (559 mm) deep, provide 61-1/4 inches (1556 mm) of vertical 19 inch E.I.A. rack space, and are equipped with key lock front and rear doors for security. Cabinet weight empty is 216 pounds (98 kg).

PD543050 System Cabinet
This cabinet is offered for larger systems requiring more vertical rack space. It has the same dimensions as the PD543000, except the PD543050 measures 78 inches (1981 mm) high with 70 inches (1778 mm) of available rack space.

PD583050 Cabinet Fan Top
The cabinet fan top is offered as an option for both the PD543000 and the PD543050 cabinets. The fan provides improved air flow and cooling for systems operating in high ambient temperature or under high transmitter power.

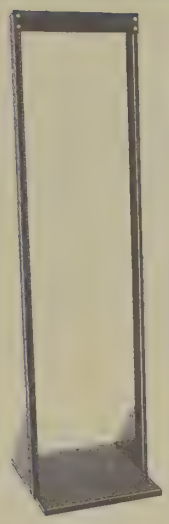
A black plastic, injection molded impeller is shaped for optimum air performance with low noise and low power consumption to provide 530 CFM free air delivery.

The UL® approved motor has an aluminum die cast housing which operates as a heat sink to minimize temperature rise. It requires a 115 VAC power source and operates over a temperature range of $^{-}22°F$ to $^{+}140°F$ ($^{-}30°C$ to $^{+}60°C$). Total weight 10 lbs. (4.5 kg.).

PD508000 Cable Assembly for System Cabinet Terminations
This cable assembly extends the transmitter/receiver input ports and antenna output ports to a location on the cabinet top panel. Type-N female bulkhead connectors are installed on the cabinet top to accept these input/outputs. The assembly includes cable, connector, installation and test of all components as a system.

The number of assemblies required for a system is the sum of the following:
1. Number of receiver inputs plus one.
2. Number of transmitter inputs plus one.
3. One additional cable if a duplexer is used.

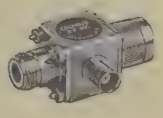
IT600 Sampler
This sampler installs between the isolator and load assembly of a multichannel transmitter combiner. It facilitates periodic maintenance of active combining systems to be performed without having to turn off channels other than the one being adjusted or checked.



PD543860

PD543000

PD583050



IT600

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Technical Data and Reference Material

NOTES ON ANTENNA SELECTION: PAGE 291

NOTES ON FILTERS, CAVITIES AND DUPLEXERS: PAGE 302

NOTES ON BIDIRECTIONAL AMPLIFIERS: PAGE 305

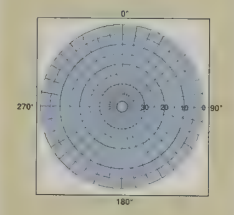
NOTES ON SYSTEM DESIGN: PAGE 307

TECHNICAL NOTES ON ANTENNA SELECTION

How do you choose the right antenna? Evaluate the form, fit, function, and cost parameters of an antenna that will do the job, then order a product from the Celwave Product Selection Guide most closely matching that ideal. If the application advances the leading edge of communications technology, consultation with Celwave's design engineers may be required to create an antenna to suit your specific needs.

Successfully achieving system design objectives depends upon your understanding and manipulation of the physics of radio signal propagation, including wavelength employed, transmitter power, receiver sensitivity, antenna height and gain, and profile of the surrounding terrain.

All these factors interact to affect system performance, but not all may be within the designer's direct control. Aesthetic considerations, zoning restrictions, rugged terrain, and budget limitations are among many constraints facing the communications system designer. The challenge is to construct an optimum system in spite of the constraints, taking full advantage of the great variety of antenna solutions offered by Celwave.



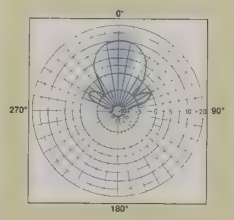
OMNIDIRECTIONAL

FREQUENCY BAND

This factor presents the first opportunity to narrow the focus on the range of antenna choices available. Many but not all antenna styles are offered in all frequency bands. Panel antennas, for example, could become prohibitively large at VHF and below and are therefore not available in that region of the spectrum. Celwave manufactures antennas for low band, mid band, high band, UHF, the 800-960 region for all services, and above 1 GHz for PCS, most fixed base, mobile, and portable applications.

DIRECTIVITY

Is the system required to transmit and receive equally well in all directions from the antenna site, or should it be focused in one or more directions? In the land mobile communications industry, the term directivity refers to beamwidth in the horizontal plane of radiation. Omnidirectional antennas are designed to radiate and receive equally in all directions, whereas directional antennas focus their energy to an area less than 360°.



DIRECTIVITY

SHARP DIRECTIVITY

YAGI ANTENNA FOR HITTING A SPECIFIC TARGET.

BEAMWIDTH

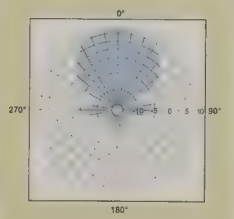
An Antenna's beamwidth is defined as the angle subtended between the two half-power (-3 dB) points on either side of the main lobe of radiation. The half-power points are symmetrical around the radius containing the peak of the main lobe.

Generally, the vertical and horizontal radiation components are independent variables to the antenna designer, meaning the vertical pattern does not change shape (gain) as the horizontal beamwidth is narrowed.

There may be legal as well as practical considerations involved in the choice of directivity. Certain cellular and paging applications require conformance to a licensed contour of operations, creating the need for directional antennas to remain within bounds. Land-based coastal applications may wish to limit the amount of radiation "wasted" over the water where there are no signal coverage requirements. Licensees not facing such restrictions may choose omnidirectional antennas for maximum signal distribution and system utility.

How much directivity to specify? Celwave antenna designs offer directional patterns ranging from low gain to high gain. For example, the addition of an external reflector rod to a fiberglass collinear antenna produces and eccentric offset pattern of about 5 dB, which retains the original antenna's broad horizontal circularity, while providing some gain increase in the favored direction and reduction in the opposite. This arrangement finds wide application in cases where some reduction in co-channel interference is required, or a slight boost in performance is needed in one general direction.

Other applications require greater focusing of the beam for a more specific, limited coverage area. The popular panel antenna in its many gain and beamwidth options has taken a predominant position as the antenna of choice over older styles such as the corner reflector, yagi, and the attachment of multiple-rod reflectors to fiberglass antennas. These older designs are more susceptible to ice buildup and higher wind-loading than the smoother, lighter panels. Panel antennas offer a greater front to back ratio and fewer side lobes than their predecessors. This can be an important consideration in sectorized cellular applications where channel-to-channel isolation for handoff is critical.



DIRECTIVITY

MILD DIRECTIVITY

POPULAR PANEL ANTENNA FOR COVERING A SECTOR.

VERTICAL BEAM:

GAIN

Vertical gain in antennas is accomplished by compressing the vertical plane radiation pattern of the antenna into a narrower beamwidth. The net effect is to focus the antenna's energy toward the horizon at the expense of the upper and lower quadrants.

Selecting the right antenna gain for the application is the subject of much analysis and investigation. Gain in traditional designs is achieved at the expense of vertical beamwidth: high gain antennas feature narrow beamwidths while the opposite is also true. This fact is not generally well understood, and leads to inappropriate gain choices and results in poorly functioning systems. Vertical beamwidth is defined as the angle subtended by the two half-power (-3 dB) points on either side of the main lobe of radiation. The half-power points are generally symmetrical around the radius containing the peak of the main lobe.

How much gain is required? Specifying as much gain as the budget permits often results in a radio system that interferes with systems in the next county or state but does not service the intended users in the immediate vicinity of the site.Celwave Sales Engineers may assist your choice of antenna gain by using charts to determine RF horizon from your site and suggesting appropriate vertical beamwidth for it.

BANDWIDTH

The generally accepted definition of bandwidth in the land mobile radio industry is the range of frequencies over which the VSWR is 1.5:1 or lower. Outside this range, the VSWR increases, with increasing frequency offset from the antenna's design center. Celwave offers a wide selection of broad, medium, and narrow antenna bandwidths.

Narrow bandwidth antennas offer the inherent advantage of filtering. Increasingly higher VSWR farther from the center frequency causes greater impedance mismatch between the antenna and feedline, and less efficient power transfer from source to load.

For receiving applications, this means greater rejection of unwanted signals away from the center frequency, and greater receiver selectivity. For transmitters, rejection of unwanted-inbound signals means lower intermodulation products generated in the transmitter's power output stage.

BANDWIDTH CHOICES

Factors influencing the bandwidth choice are inherent in the system design. Is it a one-way paging system or a two-way communications system? Simplex or duplex? Single or multiple channel?

Let's examine the implications of each question.

Single-channel paging systems require the least antenna bandwidth available. In multiple system sites, paging transmitters are often troublesome to the other tenant's systems owing to the wideband noise generated by paging's digital modulation techniques, and the sometimes higher power levels of paging transmitters. While these problems can be alleviated through the use of cavity resonators installed on the paging transmitter and/or in the nearby receivers, specifying a narrowband antenna at the outset is the first line of defense against the intermodulation and selectivity problems frequently present at paging sites.

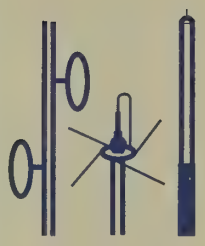
Similarly, for single-channel simplex two-way systems, the narrowband antenna offers the same filtering advantages.

Duplex (separate transmit/receive frequencies). Two-way systems and multiple-channel combined transmit and multiplex receive systems require broader bandwidth antennas to accommodate the band of frequencies in use. In conventional UHF repeaters where the transmit-receive offset is 5 MHz, a single-antenna system design incorporating a duplexer necessitates an antenna bandwidth of 5 MHz. Multiple channel duplexes systems require even greater bandwidth.

The filtering advantage is lost with greater bandwidth antennas and cavity resonators may be required in addition to the filter action supplied by the duplexer(s) in order to minimize intermodulation and selectivity problems.

STYLE

There is some performance overlap in the areas of horizontal beamwidth, gain and bandwidth among differing antenna designs. The external dipole array antenna, for example, features electrical specifications nearly identical with a comparable fiberglass collinear antenna. Both designs enjoy wide popularity. What factors influence the choice of one style over the other? In this example, mechanical considerations dictate the choice. Both antennas are DC grounded and afford a high degree of lightning protection for the equipment below. However, the lightning current discharge capability of the external dipole array is greater than that of the fiberglass antenna because it features a 2-1/4 inch pipe as the discharge path. The fiberglass style utilizes its soldered internal elements as the path to ground. Therefore, the external dipole is more rugged, but the fiberglass style antenna offers radome-protected radiating elements and tends to shed ice buildup, whereas the external dipole antenna is prone to ice buildup in heavy snowstorms.



STYLE

A similar argument can be made between Yagis and panels. For similar RF performance characteristics, Yagi antennas are generally lighter, more easily mounted and less expensive than the panel. However, Yagis are prone to ice buildup, have a longer horizontal profile, and are not generally available in the wide variety of bandwidths, beamwidths, and gain choices. Panels offer greater front-to-back ratios and fewer side lobes than Yagis, and are capable of bandwidths up to 100 MHz to satisfy the multiple channel requirements of trunked 800 systems and cellular operators. Panel antennas also provide a weather tight enclosure around the radiating elements, and tend to shed ice from their radomes. Finally, panel antennas can be painted to blend into the background when mounted on buildings, in keeping with architectural aesthetic requirements. Consult your Celwave Sales Engineer for advice on painting antennas.

NOTES ON CELLITE PANEL ANTENNAS

The result of a major breakthrough in technology, CELlite panel antennas virtually eliminate intermodulation.

CELLITE PANEL

The basic concept behind this technology is to make the entire antenna from one piece of the same aluminum alloy. In a CELlite antenna, the dipoles and the microstripline feeding network are manufactured from a single piece of aluminum. The unit is then welded into the reflector box. Because the welding is also accomplished with aluminum, there is no material discontinuity in the process. The construction of CELlite panel antennas is therefore the solution when low intermodulation is required.

In a measurement series on a standard GSM antenna, Celwave has established that at 2 x 43 dBm signal input, we can consistently obtain 3rd order intermodulation prospects lower than -110 dBm or -151 dBc. If this is calculated for the DCS requirements of 2 x 38 dBm, intermodulation of better than -166 dBc result.

CELlite panel antennas have very large bandwidths. On antennas currently in production, it is 20% for a VSWR of less than 1.5:1. For smaller bandwidths, an impressively low VSWR can be obtained. This technology makes the possibility of achieving VSWR of less than 1.2:1 in the transmit band and less than 1.3:1 in the rest of the band a reality.

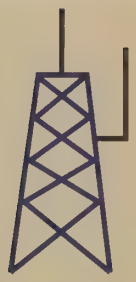
All CELlite panel antennas are surface treated after welding. This ensures that all components have additional protection against severe weather and other hostile environments. Corrosion is therefore prevented and the antennas' lifetime is significantly extended.

SIDE OR TOP MOUNT

Location of an antenna on its supporting structure exerts an influence on a system's coverage area. This can be another parameter beyond the designer's control, particularly in cases where the tower site is rented on a space-available basis and there is little choice.

Antennas mounted at the top of supporting structures such as towers have the greatest approximation to free space radiation patterns.

Antennas mounted on the side of a support structure suffer distortion of their radiating patterns, which are influenced by the nearby tower legs and coaxial runs within the antenna's aperture. The resultant effect is a "serration" of an otherwise smooth radiation pattern.



MOUNTING

This effect is more pronounced at higher frequencies, such as the 800 MHz range, where the dimensions of the tower members and coaxial runs may be close to the RF wavelengths involved. In such cases, pattern distortions can be significant. At low band, however, the distorting effect may be barely noticeable. Contrary to popular belief, there is no way to produce a genuinely omnidirectional radiation pattern using a side-mounted antenna. However, when the antenna is mounted farther from the tower, the distorting effect is minimized.

At VHF and UHF frequencies, where directional coverage is desired, the designer can take advantage of the tower's distorting effect by using a tower leg as a reflector. Generally, the resultant radiation will be directed away from the tower although the pattern will not be uniform.

RULE OF THUMB: Don't mount an antenna closer than three feet from a significant metal structure such as a tower leg. In addition to the distortion of the horizontal pattern discussed above, the impedance (VSWR) and vertical plane pattern of the antenna may also be significantly degraded.

MECHANICAL DOWNTILT

BEAMTILT

When the main radiation lobe in the vertical plan is intentionally adjusted above or below, the resultant effect is known as beamtilt. There are two categories of beamtilt, mechanical and electrical. Electrical beamtilt is obtained by adjusting the phase relationships of radiating elements within the antenna by the factory. In the case of the Penetrator, electrical beamtilt can be adjusted in the field by changing external phasing cables purchased from Celwave on antennas with that option. Mechanical beamtilt may be accomplished by physically tilting the antenna away from the perpendicular by using a shim or downtilt brackets manufactured specifically for the antenna. Celwave provides an incremental scissors style bracket set that eliminates guesswork about the setting in degrees. Downtilt of either variety should be specified only after a detailed understanding of the terrain and other propagation factors have been acquired by the designer. Most legitimate uses of beamtilt involve signal coverage restrictions required by cellular repeaters to prevent overlap with adjacent cells. Beamtilt is not a good substitute for null fill below the horizon. A lower gain antenna might well offer superior overall performance to a downtilted higher gain model.

COST CONSIDERATIONS

After electrical, mechanical and aesthetic requirements have been determined, reference to the Celwave Product Selection Guide will yield more than one antenna model suited for the task, with a range of prices to choose from.

Why the difference? Price ranges reflect added value. For example, the popular Celwave Stationmaster series includes the PD220, 5.25 dB gain VHF favorite, and the PD620 Heavy Duty model. The HD version will withstand 100 mph winds vs. 85 mph for the PD220. Naturally, the stronger version is more expensive. By contrast, the BA1012 and BA1312 are light weight models ideal for use as emergency backup antennas.

More than the price of the antenna is involved in a system installation. Also to be considered are the costs of installation labor, site access, expected lifespan of the system and cost of downtime in terms of lost subscriber billing or jeopardy to life and property in the case of public service systems. The antenna is generally the most difficult-to-service component in a radio system. It is advisable to purchase the best antenna you can afford to derive maximum uninterrupted service from your installation.

THE PENETRATOR

This marvel of antenna engineering is the exception to many of the rules mentioned in the prior discussion which generally pertained to well-known conventional designs. Owing to its unique, patented design, the Penetrator actually delivers high gain and plenty of signal below the horizon for exceptional close-in as well as far-out coverage. This performance is accomplished by the careful phasing of many half-wave dipole elements arrayed inside a large diameter, deep blue fiberglass radome. It's large, heavy and expensive, but it works as advertised, and has become the favorite of successful paging, SMR and cellular operators worldwide. The penetrator is offered for UHF, 800-960 and even the GHz range for PCS, in a variety of gains and horizontal radiation pattern combinations. A unique peanut-shaped horizontal pattern is also available for applications along long, narrow stretches of terrain such as highways, canyons, beaches, and political boundaries.

Extra cost options are available for high power operation, additional null fill with high gain models, and field adjustable electrical downtilt using Celwave-supplied external cable harnesses.

Contact your Celwave Sales Engineer for a discussion of your application and how a Penetrator could maximize your system effectiveness.

NOTES ON LIGHTNING PROTECTION

Celwave's line of lightning protection products affords reasonable protection against equipment failure due to lightning strikes when properly utilized. No single lightning protection device should be viewed as providing complete defense against lightning. Your lightning protection strategy needs to be a fundamental consideration in the planning and design of your communications facility, including tower grounding, bonding cable runs to the tower and cable bridge to the shelter, grounding of cable entrance bulkheads to internal overhead cable runways and the isolation of equipment cabinets from the lightning path.

LIGHTNING PROTECTION

The Celwave PD395 and PD593 Lightning Arrestors are rugged 50 OHM coaxial bulkhead feed through devices featuring internal circular knife-edge discharge spark gaps for conducting lightning's heavy currents safely to ground before they reach your equipment cabinets. The spark gaps "fire" from between 500 to 2,000 volts, allowing use with high power communications transmitters while discharging low level atmospheric static build-ups that are well below the high voltage potentials of an actual lightning strike.

The PD477 Cable Clamp is a complete stainless steel assembly including hardware for the grounding of 1/2 and 7/8 inch coaxial cables using up to No. 6 ground wire. Refer to manufacturer's data sheets for the minimum number of ground points required per length of coaxial cable installed on a tower.

INTERMODULATION

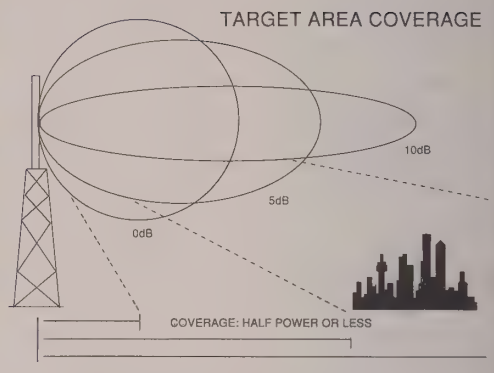
Clarity, quality and reliability of signal are the most important requirements to system operators of wireless communications. Of greatest concern in compromising the "quality of signal" is the creation of spurious responses and specifically a phenomenon known as intermodulation (IM). Intermodulation distortion can cause unreliability in wireless communications and consequently, a loss in revenue. At Celwave, our antenna products adhere to good engineering practice in product design, material selection and manufacturing techniques which guarantees their conformance to the industry's highest expectations and standards.

INTERMODULATION

Our production testing utilizes two frequency synthesizers. Each of these units has eight separate output ports and they are fully programmable for all cellular channels. Following the frequency synthesizer units, each of the 16 channels of output signal is amplified, combined and fed to the antenna under test inside the anechoic chamber. The anechoic chamber is 8'x12'x24' and can accommodate antennas up to 20' long. A spectrum analyzer is used to measure 3rd and 5th order intermodulation products. This testing is accomplished using a Hewlett Packard (HP) system controller computer. A hard copy of the test results can be generated for any antenna tested. Since much of our system is composed of actual cellsite hardware, this provides a more "real world" IM test.

Technical Data

HAAT	Radio Horizon Miles	Lower Half Power DEG in Miles												
		5.5°	6°	7°	8°	14°	16°	18°	33°	36°	40°	58°	65°	70°
150	17	0.6	0.5	0.5	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.05	0.04
300	24.5	1.1	1.1	0.9	0.8	0.5	0.4	0.4	0.2	0.2	0.2	0.1	0.1	0.1
450	30	1.8	1.6	1.4	1.2	0.7	0.6	0.5	0.3	0.3	0.2	0.2	0.1	0.1
600	34.6	2.4	2.2	1.9	1.6	0.9	0.8	0.7	0.4	0.4	0.3	0.2	0.2	0.2
750	38.7	3	2.7	2.3	2	1.2	1	0.9	0.5	0.4	0.4	0.3	0.2	0.2
1000	44.7	3.9	3.6	3.1	2.7	1.5	1.4	1.2	0.6	0.6	0.5	0.3	0.3	0.3
1500	54.8	6	5.4	6.6	4.1	2.3	2	1.8	1	0.9	0.8	0.5	0.5	0.4
2000	63.3	7.9	7.2	6.2	5.4	3.1	2.7	2.4	1.3	1.2	1	0.7	0.6	0.5
2500	70.7	9.9	9	7.7	6.8	3.9	3.4	3	1.6	1.5	1.3	0.9	0.7	0.7
3000	77.5	11.8	10.8	9.3	8.1	4.6	4	3.6	2	1.8	1.6	1	0.9	0.8
3500	83.7	13.8	12.6	10.8	9.5	5.4	4.7	4.2	2.2	2	1.8	1.2	1	0.1
4000	89.4	15.8	14.5	12.4	10.8	6.2	5.4	4.8	2.6	2.3	2.1	1.4	1.2	1.1

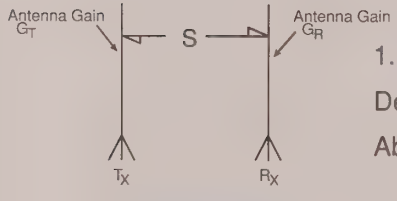


This chart is an approximation of coverage that can be expected by a given antenna. To use, simply look at the vertical beamwidth of the antenna and the height above average terrain. Look at the HAAT and go across to the vertical beamwidth. This will tell you the distance at which the lower half power point will hit the earth. The radio horizon remains constant with the given height. This is also the distance at which the main lobe is directed.

Horizon formula = $\sqrt{2H}$ where H = Height

Antenna Spacial Decoupling

$$\lambda \text{ (in.)} = \frac{11808}{\text{Freq. (MHz)}}$$



HORIZONTAL SPACING

1. Horizontal spacing:

Decoupling in dB≈22+20 LOG $\left(\frac{S}{\lambda}\right)$-($G_T$ + G_R)

Above relation valid for $\left(\frac{S}{\lambda}\right)$ >10 and G_T & G_R < 10dB

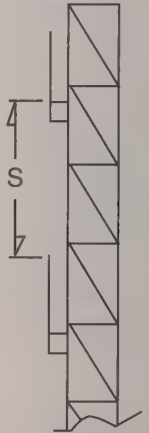
2. Vertical or Collinear spacing:

Decoupling in dB≈28+40 LOG $\left(\frac{S}{\lambda}\right)$

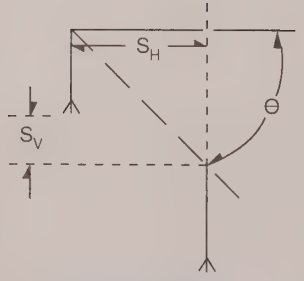
Typically $1\lambda \leq S$

and dB_{MAX}≈70dB

"S" is spacing between ends of radiating portion of antennas.



VERTICAL OR COLLINEAR SPACING



DECOUPLING

3. Slant Decoupling:

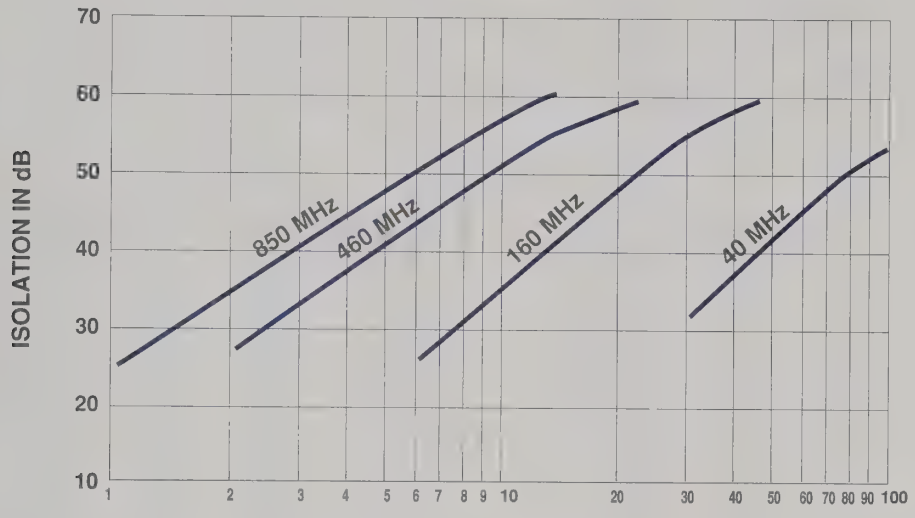
$S(dB)=(V-H) \times \frac{\theta}{90} + H$

S is Slant Decoupling
V is Vertical Decoupling
H is Horizontal Decoupling
θ is Slant angle relative to horizontal plane.

Technical Data

The curves provided below are based on dipoles. Both reflect isolation values that could be expected when two antennas are separated as indicated. In actual installations, the obtainable values may vary somewhat, due to tower coupling or other reflective surfaces near the antenna.

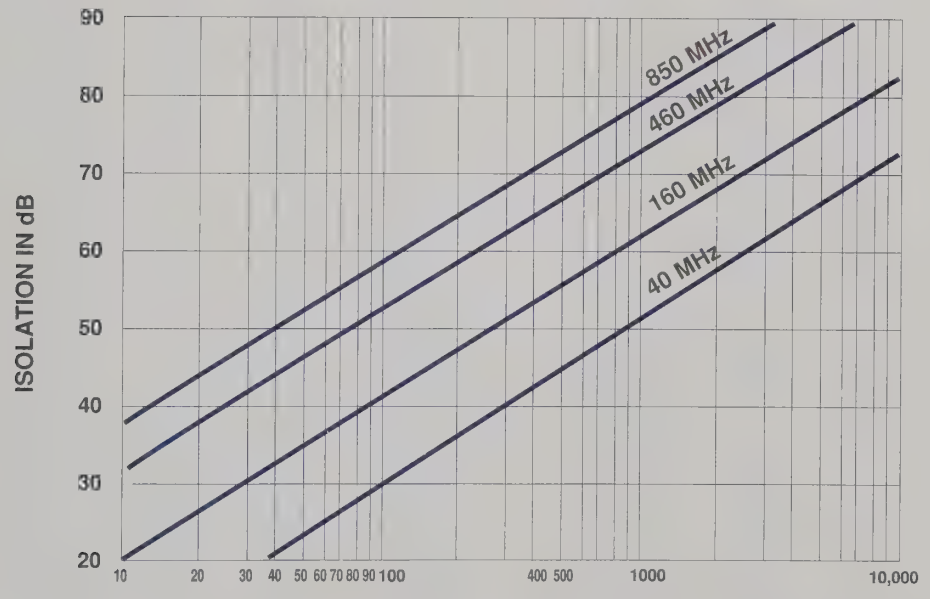
ISOLATION PROVIDED BY VERTICAL SEPARATION



ANTENNA SPACING (TIP TO BOTTOM) IN FEET

The above curves are usable with gain antennas if they are mounted exactly collinearly.

ISOLATION PROVIDED BY HORIZONTAL SEPARATION



ANTENNA SPACING IN FEET

The above curves may also be used to approximate the isolation between gain antennas at less than the following minimum distances. The figures in dB refer to the antenna gains. (150 MHz): 3 dB-18 ft., 6 dB-75 ft., 10 dB-300 ft. (450 MHz): 3 dB-6 ft., 6 dB-25 ft., 10 dB-100 ft. (850 MHz): 3 dB-3 ft., 6 dB-12 ft., 10 dB-50 ft. At greater distances than the preceding, the sum of both antenna gains should be subtracted from the value found in the chart.

Technical Data

Given: Decibels
To Find: Power and Voltage Current Ratios

To Account for the Sign of the Decibel
For positive (+) values of the decibel – Both voltage and power ratios are greater than unity. Use the two right hand columns.

For negative (-) values of the decibel – Both voltage and power ratios are less than the unity. Use the two left hand columns.

Example –
Given: ≠ 9.1 dB Find:

dB	POWER RATIO	VOLTAGE RATIO
+ 9.1	8.128	2.851
- 9.1	0.1230	0.3508

TABLE 1

VOLTAGE RATIO	POWER RATIO	◀ - dB + ▶ dB	VOLTAGE RATIO	POWER RATIO	VOLTAGE RATIO	POWER RATIO	◀ - dB + ▶ dB	VOLTAGE RATIO	POWER RATIO
1.0000	**1.0000**	**0.0**	**1.000**	**1.000**	**.5623**	**.3162**	**5.0**	**1.778**	**3.162**
.9886	.9772	0.1	1.012	1.023	.5559	.3090	5.1	1.799	3.236
.9772	.9550	0.2	1.023	1.047	.5495	.3020	5.2	1.820	3.311
.9661	.9333	0.3	1.035	1.072	.5433	.2951	5.3	1.841	3.388
.9550	.9120	0.4	1.047	1.096	.5370	.2884	5.4	1.862	3.467
.9441	.8913	0.5	1.059	1.122	.5309	.2818	5.5	1.884	3.548
.9333	.8710	0.6	1.072	1.148	.5248	.2754	5.6	1.905	3.631
.9226	.8511	0.7	1.084	1.175	.5188	.2692	5.7	1.928	3.715
.9120	.8318	0.8	1.096	1.202	.5129	.2630	5.8	1.950	3.802
.9016	.8128	0.9	1.109	1.230	.5070	.2570	5.9	1.972	3.890
.8913	**.7943**	**1.0**	**1.122**	**1.259**	**.5012**	**.2512**	**6.0**	**1.995**	**3.981**
.8810	.7762	1.1	1.135	1.288	.4955	.2455	6.1	2.018	4.074
.8710	.7586	1.2	1.148	1.318	.4898	.2399	6.2	2.042	4.169
.8610	.7413	1.3	1.161	1.349	.4842	.2344	6.3	2.065	4.266
.8511	.7244	1.4	1.175	1.380	.4786	.2291	6.4	2.089	4.365
.8414	.7079	1.5	1.189	1.413	.4732	.2239	6.5	2.113	4.467
.8318	.6918	1.6	1.202	1.445	.4677	.2188	6.6	2.138	4.571
.8222	.6761	1.7	1.216	1.479	.4624	.2138	6.7	2.163	4.677
.8128	.6607	1.8	1.230	1.514	.4571	.2089	6.8	2.188	4.786
.8035	.6457	1.9	1.245	1.549	.4519	.2042	6.9	2.213	4.898
.7943	**.6310**	**2.0**	**1.259**	**1.585**	**.4467**	**.1995**	**7.0**	**2.239**	**5.012**
.7852	.6166	2.1	1.274	1.622	.4416	.1950	7.1	2.265	5.129
.7762	.6026	2.2	1.288	1.660	.4365	.1905	7.2	2.291	5.248
.7674	.5888	2.3	1.303	1.698	.4315	.1862	7.3	2.317	5.370
.7586	.5754	2.4	1.318	1.738	.4266	.1820	7.4	2.344	5.495
.7499	.5623	2.5	1.334	1.778	.4217	.1778	7.5	2.371	5.623
.7413	.5495	2.6	1.349	1.820	.4169	.1738	7.6	2.399	5.754
.7328	.5370	2.7	1.365	1.862	.4121	.1698	7.7	2.427	5.888
.7244	.5248	2.8	1.380	1.905	.4074	.1660	7.8	2.455	6.026
.7161	.5129	2.9	1.396	1.950	.4027	.1622	7.9	2.483	6.166
.7079	**.5012**	**3.0**	**1.413**	**1.995**	**.3981**	**.1585**	**8.0**	**2.512**	**6.310**
.6998	.4898	3.1	1.429	2.042	.3936	.1549	8.1	2.541	6.457
.6918	.4786	3.2	1.445	2.089	.3890	.1514	8.2	2.570	6.607
.6839	.4677	3.3	1.462	2.138	.3846	.1479	8.3	2.600	6.761
.6761	.4571	3.4	1.479	2.188	.3802	.1445	8.4	2.630	6.918
.6683	.4467	3.5	1.496	2.239	.3758	.1413	8.5	2.661	7.079
.6607	.4365	3.6	1.514	2.291	.3715	.1380	8.6	2.692	7.244
.6531	.4266	3.7	1.531	2.344	.3673	.1349	8.7	2.723	7.413
.6457	.4169	3.8	1.549	2.399	.3631	.1318	8.8	2.754	7.586
.6383	.4074	3.9	1.567	2.455	.3589	.1288	8.9	2.786	7.762
.6310	**.3981**	**4.0**	**1.585**	**2.512**	**.3548**	**.1259**	**9.0**	**2.818**	**7.943**
.6237	.3890	4.1	1.603	2.570	.3508	.1230	9.1	2.851	8.128
.6166	.3802	4.2	1.622	2.630	.3467	.1202	9.2	2.884	8.318
.6095	.3715	4.3	1.641	2.692	.3428	.1175	9.3	2.917	8.511
.6026	.3631	4.4	1.660	2.754	.3388	.1148	9.4	2.951	8.710
.5957	.3548	4.5	1.679	2.818	.3350	.1122	9.5	2.985	8.913
.5888	.3467	4.6	1.698	2.884	.3311	.1096	9.6	3.020	9.120
.5821	.3388	4.7	1.718	2.951	.3273	.1072	9.7	3.055	9.333
.5754	.3311	4.8	1.738	3.020	.3236	.1047	9.8	3.090	9.550
.5689	.3236	4.9	1.758	3.090	.3199	.1023	9.9	3.126	9.772

Technical Data

TABLE 1 (Continued)

VOLTAGE RATIO	POWER RATIO	◀ - dB + ▶ dB	VOLTAGE RATIO	POWER RATIO
.3162	**.1000**	**10.0**	**3.162**	**10.000**
.3126	.09772	10.1	3.199	10.23
.3090	.09550	10.2	3.236	10.47
.3055	.09333	10.3	3.273	10.72
.3020	.09120	10.4	3.311	10.96
.2985	.08913	10.5	3.350	11.22
.2951	.08710	10.6	3.388	11.48
.2917	.08511	10.7	3.428	11.75
.2884	.08318	10.8	3.467	12.02
.2851	.08128	10.9	3.508	12.30
.2818	**.07943**	**11.0**	**3.548**	**12.59**
.2786	.07762	11.1	3.589	12.88
.2754	.07586	11.2	3.631	13.18
.2723	.07413	11.3	3.673	13.49
.2692	.07244	11.4	3.715	13.80
.2661	.07079	11.5	3.758	14.13
.2630	.06918	11.6	3.802	14.45
.2600	.06761	11.7	3.846	14.79
.2570	.06607	11.8	3.890	15.14
.2541	.06457	11.9	3.936	15.49
.2512	**.06310**	**12.0**	**3.981**	**15.85**
.2483	.06166	12.1	4.027	16.22
.2455	.06026	12.2	4.074	16.60
.2427	.05888	12.3	4.121	16.98
.2399	.05754	12.4	4.169	17.38
.2371	.05623	12.5	4.217	17.78
.2344	.05495	12.6	4.266	18.20
.2317	.05370	12.7	4.315	18.62
.2291	.05248	12.8	4.365	19.05
.2265	.05129	12.9	4.416	19.50
.2239	**.05012**	**13.0**	**4.467**	**19.95**
.2213	.04898	13.1	4.519	20.42
.2188	.04786	13.2	4.571	20.89
.2163	.04677	13.3	4.624	21.38
.2138	.04571	13.4	4.677	21.88
.2113	.04467	13.5	4.732	22.39
.2089	.04365	13.6	4.786	22.91
.2065	.04266	13.7	4.842	23.44
.2042	.04169	13.8	4.898	23.99
.2018	.04074	13.9	4.955	24.55
.1995	**.03981**	**14.0**	**5.012**	**25.12**
.1972	.03890	14.1	5.070	25.70
.1950	.03802	14.2	5.129	26.30
.1928	.03715	14.3	5.188	26.92
.1905	.03631	14.4	5.248	27.54
.1884	.03548	14.5	5.309	28.18
.1862	.03467	14.6	5.370	28.84
.1841	.03388	14.7	5.433	29.51
.1820	.03311	14.8	5.495	30.20
.1799	.03236	14.9	5.559	30.90
.1778	**.03162**	**15.0**	**5.623**	**31.62**
.1758	.03090	15.1	5.689	32.36
.1738	.03020	15.2	5.754	33.11
.1718	.02951	15.3	5.821	33.88
.1698	.02884	15.4	5.888	34.67
.1679	.02818	15.5	5.957	35.48
.1660	.02754	15.6	6.026	36.31
.1641	.02692	15.7	6.095	37.15
.1622	.02630	15.8	6.166	38.02
.1603	.02570	15.9	6.237	38.90

VOLTAGE RATIO	POWER RATIO	◀ - dB + ▶ dB	VOLTAGE RATIO	POWER RATIO
.1585	**.02512**	**16.0**	**6.310**	**39.81**
.1567	.02455	16.1	6.383	40.74
.1549	.02399	16.2	6.457	41.69
.1531	.02344	16.3	6.531	42.66
.1514	.02291	16.4	6.607	43.65
.1496	.02239	16.5	6.683	44.67
.1479	.02188	16.6	6.761	45.71
.1462	.02138	16.7	6.839	46.77
.1445	.02089	16.8	6.918	47.86
.1429	.02042	16.9	6.998	48.98
.1413	**.01995**	**17.0**	**7.079**	**50.12**
.1396	.01950	17.1	7.161	51.29
.1380	.01905	17.2	7.244	52.48
.1365	.01862	17.3	7.328	53.70
.1349	.01820	17.4	7.413	54.95
.1334	.01778	17.5	7.499	56.23
.1318	.01738	17.6	7.586	57.54
.1303	.01698	17.7	7.674	58.88
.1288	.01660	17.8	7.762	60.26
.1274	.01622	17.9	7.852	61.66
.1259	**.01585**	**18.0**	**7.943**	**63.10**
.1245	.01549	18.1	8.035	64.57
.1230	.01514	18.2	8.128	66.07
.1216	.01479	18.3	8.222	67.61
.1202	.01445	18.4	8.318	69.18
.1189	.01413	18.5	8.414	70.79
.1175	.01380	18.6	8.511	72.44
.1161	.01349	18.7	8.610	74.13
.1148	.01318	18.8	8.710	75.86
.1135	.01288	18.9	8.811	77.62
.1122	**.01259**	**19.0**	**8.913**	**79.43**
.1109	.01230	19.1	9.016	81.28
.1096	.01202	19.2	9.120	83.18
.1084	.01175	19.3	9.226	85.11
.1072	.01148	19.4	9.333	87.10
.1059	.01122	19.5	9.441	89.13
.1047	.01096	19.6	9.550	91.20
.1035	.01072	19.7	9.661	93.33
.1023	.01047	19.8	9.772	95.50
.1012	.01023	19.9	9.886	97.72
.1000	**.01000**	**20.0**	**10.000**	**100.00**

VOLTAGE RATIO	POWER RATIO	◀ - dB + ▶ dB	VOLTAGE RATIO	POWER RATIO
3.162×10^{-1}	**10^{-1}**	**10**	**3.162**	**10**
10^{-1}	10^{-2}	20	10	10^{2}
3.162×10^{-2}	10^{-3}	30	3.162×10	10^{3}
10^{-2}	10^{-4}	40	10^{2}	10^{4}
3.162×10^{-3}	10^{-5}	50	3.162×10^{2}	10^{5}
10^{-3}	10^{-6}	60	10^{3}	10^{6}
3.162×10^{-4}	10^{-7}	70	3.162×10^{3}	10^{7}
10^{-4}	10^{-8}	80	10^{4}	10^{8}
3.162×10^{-5}	10^{-9}	90	3.162×10^{4}	10^{9}
10^{-5}	**10^{-10}**	**100**	**10^{5}**	**10^{10}**

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DECIBELS (dB) AND POWER, VOLTAGE, AND CURRENT RATIOS

Power Ratio	Voltage and& Current Ratio	Decibels	Power Ratio	Voltage and Current Ratio	Decibels
1.0233	1.0116	0.1	19.953	4.4668	13.0
1.0471	1.0233	0.2	26.119	5.0119	14.0
1.0715	1.0351	0.3	31.623	5.6234	15.0
1.0965	1.0471	0.4	39.811	6.3096	16.0
1.1220	1.0593	0.5	50.119	7.0795	17.0
1.1482	1.0715	0.6	63.096	7.9433	18.0
1.1749	1.0839	0.7	79.433	8.9125	19.0
1.2023	1.0956	0.8	100.00	10.0000	20.0
1.2303	1.1092	0.9	158.49	12.589	22.0
1.2589	1.1220	1.0	251.19	15.849	24.0
1.3183	1.1482	1.2	398.11	19.953	26.0
1.3804	1.1749	1.4	630.96	25.119	28.0
1.4454	1.2023	1.6	1000.0	31.623	30.0
1.5136	1.2303	1.8	1584.9	39.811	32.0
1.5849	1.2589	2.0	2511.9	50.119	34.0
1.6595	1.2882	2.2	3981.1	63.096	36.0
1.7378	1.3183	2.4	6309.6	79.433	38.0
1.8197	1.3490	2.6	10^4	100.000	40.0
1.9055	1.3804	2.8	10^4 x 1.5849	125.89	42.0
1.9953	1.4125	3.0	10^4 x 2.5119	158.49	44.0
2.2387	1.4962	3.5	10^4 x 3.9811	199.53	46.0
2.5119	1.5849	4.0	10^4 x 6.3096	251.19	48.0
2.8184	1.6788	4.5	10^5	316.23	50.0
3.1623	1.7783	5.0	10^5 x 1.5849	398.11	52.0
3.5481	1.8836	5.5	10^5 x 2.5119	501.19	54.0
3.9811	1.9953	6.0	10^5 x 3.9811	630.96	56.0
5.0119	2.2387	7.0	10^5 x 6.3096	794.33	58.0
6.3096	2.5119	8.0	10^6	1,000	60.0
7.9433	2.8184	9.0	10^7	3,162.3	70.0
10.000	3.1623	10.0	10^8	10,000.0	80.0
12.589	3.5481	11.0	10^9	31,623	90.0
15.849	3.9811	12.0	10^{10}	100,000	100.0

To convert:
Decibels to nepers multiply by 0.1151.
Nepers to decibels multiply by 8.686.
Where the power ratio is less than unity, it is usual to invert the fraction and express the answer as a decibel loss.

Technical Data

RETURN LOSS vs VSWR

RETURN LOSS dB	VSWR	RETURN LOSS dB	VSWR	RETURN LOSS dB	VSWR
0.0	∞	21.0	1.196	42.0	1.0160
0.5	34.7	21.5	1.184	42.5	1.0151
1.0	17.3	22.0	1.172	43.0	1.0143
1.5	11.6	22.5	1.162	43.5	1.0134
2.0	8.71	23.0	1.162	44.0	1.0127
2.5	7.00	23.5	1.143	44.5	1.0120
3.0	5.85	24.0	1.135	45.0	1.0113
3.5	5.02	24.5	1.127	45.5	1.0107
4.0	4.42	25.0	1.119	46.0	1.0101
4.5	3.95	25.5	1.112	46.5	1.0095
5.0	3.57	26.0	1.105	47.0	1.0090
5.5	3.26	26.5	1.099	47.5	1.0085
6.0	3.01	27.0	1.094	48.0	1.0080
6.5	2.80	27.5	1.088	48.5	1.0075
7.0	2.62	28.0	1.083	49.0	1.0071
7.5	2.46	28.5	1.078	49.5	1.0067
8.0	2.32	29.0	1.074	50.0	1.0063
8.5	2.21	29.5	1.069	50.5	1.0060
9.0	2.10	30.0	1.065	51.0	1.0057
9.5	2.01	30.5	1.062	51.5	1.0053
10.0	1.92	31.0	1.058	52.0	1.0050
10.5	1.85	31.5	1.055	52.5	1.0048
11.0	1.79	32.0	1.051	53.0	1.0045
11.5	1.72	32.5	1.049	53.5	1.0042
12.0	1.67	33.0	1.046	54.0	1.0040
12.5	1.62	33.5	1.043	54.5	1.0038
13.0	1.58	34.0	1.041	55.0	1.0035
13.5	1.53	34.5	1.038	55.5	1.0034
14.0	1.50	35.0	1.036	56.0	1.0032
14.5	1.46	35.5	1.034	56.5	1.0030
15.0	1.43	36.0	1.032	57.0	1.0028
15.5	1.40	36.5	1.030	57.5	1.0027
16.0	1.38	37.0	1.029	58.0	1.0025
16.5	1.35	37.5	1.027	58.5	1.0024
17.0	1.33	38.0	1.026	59.0	1.0022
17.5	1.31	38.5	1.024	59.5	1.0021
18.0	1.29	39.0	1.023	60.0	1.0020
18.5	1.27	39.5	1.021	60.5	1.00189
19.0	1.25	40.0	1.020	61.0	1.00178
19.5	1.233	40.5	1.0191	61.5	1.00168
20.0	1.222	41.0	1.0180	62.0	1.00159
20.5	1.208	41.5	1.0170	62.5	1.00150

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Filters are important passive RF devices that perform selective frequency discrimination. As a class, filters also include duplexer and cavity resonators. Filters are designed to pass a band of frequencies, reject a band, or to combine those actions.

Four prime filter characteristics of concern to the system designer are insertion loss, attenuation, bandwidth, and selectivity. Each must be considered carefully in the selection of a filter product in order to ensure satisfactory system performance.

INSERTION LOSS AND ATTENUATION

Both represent reduction of available signal power after filtering. Generally speaking, the designer selects the filter with the least loss and the most attenuation consistent with other application requirements.

DECIBEL LOSS = POWER LOSS	
0.5 dB	10.8%
1.0 dB	20.5%
2.0 dB	36.9%
3.0 dB	50.0%
10.0 dB	90.0%
60.0 dB	99.9999%

DECIBEL LOSS

THE DECIBEL IS ABBREVIATED dB WHERE B IS IN HONOR OF ALEXANDER GRAHAM BELL

Although one may discuss loss directly in terms of Watts, it is common practice to use the Decibel to express the ratio of power output to power input. Using Decibels makes insertion loss and attenuation performance characteristics independent of the actual powers or voltages in use.

The Decibel (abbreviated dB, where the B is in honor of Alexander Graham Bell) is computed as 10log (Pout/Pin). where log is the common logarithm function (base 10). Pout is the measured output power from the filter; Pin is the measure of power input to the filter. A few useful ratios and their corresponding Decibels are tabulated on chart to right:

As many be seen from the table, the often-heard expression "half-power point" signifies that spot on the response curve where the output power has been reduced by 3 dB, regardless of the actual power level.

Insertion loss is the amount of power unavoidably absorbed by the filter. It's an unintended side effect...a "cost of doing business" with the filter. In the bandpass region of the filter's response curve, this figure sets the maximum amount of desired signal passed through to the output after processing. There are practical lower limits on insertion loss, around 0.5 dB. A 3 dB insertion loss, for example, spends half your power in the filter. Sometimes a relatively high amount is unavoidable, as in transmitter combiners.

MORE ON ATTENUATION

Attenuation is also power absorbed by the filter as an intentional benefit. It applies to band rejection, and is the extent to which the undesired signal is blocked from the filter's output. In duplexers, whose task it is to prevent transmitter power from entering the receiver's input, a 60 dB attenuation is generally considered a minimal safety margin.

Some filters offer up to 100 dB or more attenuation, a very significant reduction in the unwanted signal. For repeater service, consult the radio manufacturer's data sheet for recommended attenuation required.

ISOLATION

Isolation is the amount of attenuation between named ports of a filter. For example, a duplexer specified as having 60 dB of attenuation between the receiver port and the transmitter port may be said to have 60 dB port-to-port isolation.

SELECTIVITY

BANDWIDTH

The amount of frequency spectrum between the two half-power, or 3 dB, points of a filter's response curve is defined as the filter's bandwidth. If the filter has a complex response curve, there may be one or more pass bandwidths and reject bandwidths associated with the device.

SELECTIVITY

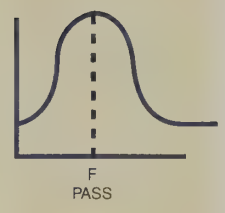
The shape of the filter's response curve defines the filter's selectivity characteristics. Sharp curves with steep "skirts" have relatively narrow bandwidths, and are considered highly selective. A relatively wide bandwidth has broad selectivity. Each selectivity extreme has utility for a given set of circumstances facing the system designer.

TYPES OF FILTERS

Types of filters available to the designer include lowpass, highpass, bandpass, and bandreject filters. Low pass filters attenuate radio frequency energy above a certain cutoff point. In other words, they pass low. A typical use of a low pass filter involves suppressing the unwanted second harmonic and others above it from a transmitter. For example, a transmitter designed for 27 mHz service will generate a second harmonic at 54 mHz and, to a lesser extent, higher multiples. A good low pass filter will only permit the 27 mHz energy to reach the antennna, thus preventing interference with other radio services.

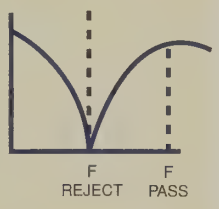
Highpass filters attenuate radio frequency energy below a certain cutoff point. These filters pass high. They are the electrical mirror image of low pass filters.

Bandpass filters pass a band of frequencies between specified low and high frequency cutoff points. RF energy above and below these cutoff frequencies is attenuated. Bandpass filters find wide application in land mobile communications work. A typical application involves high power paging transmitters, where digital modulation tends to create adjacent channel interference with nearby simplex or repeater receivers. Use of a bandpass-style filtering device (usually a cavity resonator) will "sharpen" the paging transmitter's RF output spectrum, permitting only the energy in the immediate vicinity of the carrier to be radiated from the antenna.



BANDPASS

Bandreject filters block, or "notch out", a band of frequencies between specified low and high frequency cutoff points. These devices are the electrical mirror image of bandpass filters. RF energy below and above the cutoff points is passed to the filter output. Bandreject filters also find wide application in the land mobile industry. As in the paging transmitter example, receivers with insufficient inherent selectivity that experience such interference can be outfitted with a notch filter adjusted to the offending transmitter's frequency, which effectively eliminates the interfering signal. Sometimes filters are required on both radios to completely solve interference problems at a site.



BANDREJECT

RESONANT CAVITIES

Successful commercial products are usually based on one of three basic designs: helical, transverse electromagnetic (TEM), and waveguide. In most common use at this time are the helical and TEM styles.

TEM CAVITIES

TEM cavities are usually built as quarter- or three quarter-wavelength resonators, with the long design used for low loss, high selectivity applications. The Q or quality factor of a TEM cavity increases as the diameter is increased to a limit point, depending upon the conductivity of the materials used in its construction. Silver plating can be applied to improve the cavity's Q.

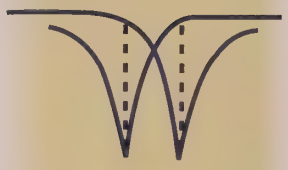
Frequency stability of a TEM cavity can be precisely controlled by incorporating an invar rod for tuning the inner conductor. Invar, with its low coefficient of expansion vs. temperature, allows the cavity to be tuned over a wide range of frequencies while the length of the tuning rod remains nearly constant over an extended range of ambient temperatures. Celwave product designers take full advantage of all of these techniques to offer superior frequency stability performance.

HELICAL CAVITIES

Helical cavities have generally been designed for low power, low Q applications such as receiver front-ends and mobile duplexers. As with the TEM style, the Q of the helical type is proportionate to the cavity diameter. Temperature compensation in helical cavities is more difficult to control than with TEM cavities, so helical designs are not specified for narrow bandwidth requirements.

DUPLEXERS

These products are an integration of filter sections, generally cavity resonators, and are used predominantly to facilitate duplex repeater operation utilizing a single antenna and feedline. Duplexers range in size and power handling capability from small mobile types to high-power base station units. They provide the critical isolation between receiver and transmitter that allows both to be connected to the antenna simultaneously without the need for a transmit-receive relay.



DUPLEXER

Where tower space permits, an effective alternative to a duplexer is two separate antennas and feedlines - one for the transmitter, the other for the receiver - with adequate physical separation between. The physical antenna separation creates the electrical isolation otherwise provided by the duplexer.

How much isolation is necessary? Consult the radio manufacturer's duplex isolation curves to determine the amount of transmitter noise suppression and receiver isolation required for good performance with minimal desensitization and intermodulation problems.

A NOTE OF CAUTION

A note of caution on the use of inexpensive, low-power helical duplexers for repeater operation.

First-quality transmitters designed and manufactured with care regarding circuit layout, interstage shielding, and spurious frequency suppression, generally interface satisfactorily with this duplexer design.

However, transmitters designed to less stringent performance standards frequently emit considerable wideband noise on either side of the carrier frequency. Due to the steep skirts characteristic of the helical duplexer response curve, some of the wideband noise may fall outside the filter's notch bandwidth, thereby entering the repeater's receiver and causing desensitization. This problem is usually wrongly blamed upon a "faulty" duplexer when, in reality, the filter is performing to factory specs. The problem really lies in the transmitter's inadequate design or improper tuning.

If the problem cannot be cured within the transmitter, the only solution is to resort to a larger, more expensive TEM cavity resonator style of duplexer with the Q and attenuation characteristics needed to prevent the wideband noise from entering the receiver.

The cost and construction of duplexers varies with the transmit-receive frequency separation (offset) required, power handling capability, and ambient RF environmental constraints. For applications in which the offsets are relatively wide (about 4.5 mHz or more), duplexers can be constructed using bandpass cavities. The inherent advantage of this design is that unwanted signal rejection occurs for all frequencies outside the intended passbands, not just at the duplexer's own transmit frequency. This duplexer design is preferred for high ambient RF environments - such as crowded, leased tower sites or urban building rooftops - where it provides strong defense against unwanted signals from nearby antennas.

Where the frequency offsets are closer (between about 0.5 mHz and 4.5 mHz) bandreject cavities can be used to build a duplexer. This cavity style offers the benefits of high isolation and low insertion loss, but the resulting duplexer generally lacks attenuation at frequencies other than the transmit and receive frequencies specified. Consequently, this design should not be used where high ambient RF levels exist, unless other auxiliary filtering is considered.

The number of cavities of either type required for duplexer construction varies with the level of port-to-port isolation required. Both types of cavities may be cascaded for greater duplexer isolation.

TUNING

FILTER TUNING

A good rule-of-thumb to remember when tuning any RF filter of the types described above: Never tune the unit under full power. Always rely upon small-signal methods using service monitors, frequency generators, calibrated receivers, etc. The reason: during the tuneup process, off-resonance conditions occur when the tuning screws are adjusted for their optimum setting. At resonance, the reactive components increase sharply, as does the corresponding voltage drop across insulating parts. High voltage drops may lead to arcing, which can leave permanent carbon traces across internal insulating material. Leakage across these traces causes instability in the filter's tuning, and noisy duplex operation. In designs employing moving finger stock for ground contact, arcing and pitting will occur when the finer stock position is changed in the presence of power, resulting in the same deteriorated performance. Damage of this nature is generally ruinous to the filter.

Celwave will tune your new or used duplexer for you, and supply tuning instructions upon request. Consult your Celwave Sales Engineer for details.

TECHNICAL NOTES ON BIDIRECTIONAL AMPLIFIERS

Extending signal coverage inside buildings and tunnels was a tough problem until the BDA was created.

The Celwave BDA family is noted for unique design concepts and features. It is offered in a variety of transmitter power levels, as well as receiver sensitivities and selectivity choices in the 800-900 MHz region for 800 conventional, Trunked SMR, U.S. Cellular A and B bands, ETACS and GSM.

The Celwave BDA consists of two complete repeater systems housed in a single enclosure and connected in parallel through two duplexers feeding two antennas. One repeater path serves to receive and amplify ambient signals from the outside for radiation into the service area. The other repeater path does the opposite, retransmitting signals from the portables and mobiles operating within the service area back to the outside. Thus, repeater #1's receiver and repeater #2's transmitter are connected through a duplexer to the outside antenna; repeater #1's transmitter and repeater #2's receiver are connected through a duplexer to an inside antenna serving the dead zone.

BIDIRECTIONAL AMPLIFIER

Both repeaters are open and broadbanded, although the duplexers provide bandpass characteristics for each. The term Open signifies that no modulation processing is performed. Broadbanded means any signal appearing in one receiver's passband is amplified and retransmitted on the same RF frequency with the same modulation characteristics. Note: optional filters are available to pass cellular A band or B band signals exclusively, so one cellular operator can provide enhanced coverage in an area without boosting the competition's signal also.

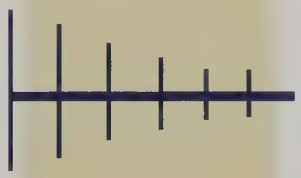
No frequency translation or demodulation occurs. The Celwave BDA is digital ready as it exists. There is, however, an Automatic Gain Control between the receivers and transmitters to reduce the gain. This limits intermodulation to a fixed level during overload. In addition, Celwave BDAs have a manual gain control plus an overload recognition circuit that senses when the AGC range is exceeded and turns off the unit for about 5 seconds. This feature helps prevent interference generation.

CELWAVE BDA DESIGN PRINCIPLES APPLIED

Though two duplexers are provided because the two repeaters operate in identical frequency spectra, the potential for feedback between the two ports exists. Accordingly, an important applications requirement is substantial physical separation between the two antennas. Applications that include multi-story buildings, underground parking garages, and rail tunnels are a "natural" for this product.

Typical installation: A five story building with a central elevator shaft. Sometimes reflective glass or heavy internal construction prevents signals from reaching the lower floors or interior offices. An optimum BDA layout consists of mounting the BDA cabinet near the core, ideally within the elevator shaft or telco/electrical utility closet with vertical conduits. AC power must be available from a minimum 15 Amp circuit.

The ambient signal capture antenna should be directional and roof mounted, with a clear shot to the repeater or paging tower, using a Yagi or panel-style antenna for better front-to-back ratio. Connect this antenna to the BDA using heavy, hardline coaxial cable (minimum 7/8 inch) to minimize loss. Route the cable to the BDA cabinet using the elevator shaft or other conduit as available. Check fire and building codes before specifying cable.



YAGI STYLE

BETTER FRONT-TO-BACK RATIO

USE A YAGI OR PANEL STYLE ANTENNA FOR BETTER FRONT-TO-BACK RATIO.

The supplemental signal antenna may be directional or omnidirectional, depending on requirements. Providing coverage from the corner of a parking garage, for example, calls for a directional style. Achieving 360 degree coverage from an elevator shaft or utility closet calls for an omnidirectional antenna. In the omnidirectional case, choose a low gain antenna (zero or 3 dB) to take advantage of the broad vertical beamwidth and to assure maximum coverage to the floors above and below the antenna.

To further enhance the internal supplemental signal to and from the BDA, radiating coaxial cable can be employed. There is a tradeoff to be considered with radiating cable: signal is intentionally lost before it reaches the antenna, so there is less signal to radiate. However, the overall vertical signal fill pattern can be better.

BDA SOFTWARE

NOTE:

Because the BDA is optimized for in-building applications it would not do as well on a mountain top. Although it has the same gain and power as units costing up to 3 times as much, it does not have a totally weatherproof housing and remote monitor/control features. As with all broadband frequency repeaters, antenna isolation and hetrodyned signals are of greater concern in outdoor installations. And while Celwave BDAs can provide 200,000 square feet of coverage indoors or up to 6 miles outdoors, a complete propagation analysis should always be made to determine if a Celwave BDA can provide the coverage you need.

SOFTWARE

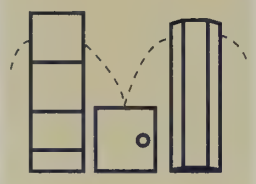
In order to relieve the system designer of tedious calculations, Celwave offers a 3.5" diskette that simplifies your choice of the BDA model that most closely suits your requirement. The software requires absolute ambient signal strength data in microvolts for both the service area and at the signal capture antenna site in order to perform. The software is available in DOS format, and can be run directly from the floppy drive of most IBM and IBM-compatible computers.

Contact your Celwave Sales Engineer for your free copy.

TECHNICAL NOTES ON SYSTEM DESIGN

Designing radio systems to meet or exceed performance objectives requires good planning and attention to detail. Any aspect of the system left to chance, including its physical or electrical environment, is likely to reduce its performance.

Although each segment of the communications industry has its own peculiar set of problems, one can generalize about system design in terms of good engineering practice and common sense.



SYSTEM DESIGN

DEFINITION OF A SYSTEM: A COLLECTION OF RELATED ELEMENTS FUNCTIONING TOGETHER AS A WHOLE.

While this might seem both fundamental and trivial, many difficulties with system debugging derive from the designer's failure to consider all of the "related elements." Among factors that can affect system performance: the influence of the tower leg upon a side-mounted antenna, carrier frequency or power output instability due to line voltage fluctuations, temperature and humidity variations, nearby sources of RF whose intermodulation products land in your receiver's passband, dangerous weather phenomena, atmospheric "skip" conditions, the sunspot cycle, the related propagation characteristics of each frequency band. These and a host of others can have an impact upon your actual system performance.

THERE ARE THREE MAIN GROUPING OF SYSTEM INFLUENCES THE DESIGNER MUST CONSIDER:VARIABLES, PARAMETERS AND CONSTRAINTS.

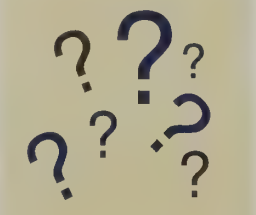
Variables can be changed at the will of the designer. Parameters may change but are not under the designer's direct control. Constraints are dictates of the system design objectives or the demands of the system owners. Variables require offensive planning, parameters require defensive strategies, and constraints demand accommodation. Variables include: transmitter power level, receiver gain, antenna gain, antenna height, site location (sometimes), and other elements generally subject to the designer's choosing.

Parameters include the direction of the wind, the amount of snowfall and ice accumulation, presence of other RF sources at a community tower site, frequency assignment issued by the FCC and coordinating agency, and other circumstances pre-dating your system installation.

Constraint examples include the system's coverage area, the requirement to avoid interfering with another nearby co-channel system, availability of channels for expansion, area height restrictions for antennas, and the budget for equipment and labor.

BASIC QUESTIONS

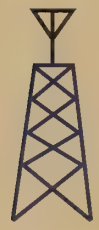
The following questions are a good starting point in the design of a new radio communication system: Who are the users of the proposed system? What is their activity profile? How many are there? How geographically widespread are they? Do they need to communicate among themselves directly, or through a central point? Do they require information security? Should they be individually licensed? Does their airtime need to be tracked for billing? Do they need to interconnect with other systems?



BASIC QUESTIONS

Answers to these questions lead the designer to hardware and regulatory decisions. Identifying the user community as to type and category directs the designer to the applicable part of the FCC Rules and Regulations under which they may qualify: business, government, personal, common carrier, etc. This step also leads to a range of choices concerning available frequency bands. The estimated activity profile and number of users instructs the designer about the number of channels required, and whether co-channel interference can be tolerated.

Estimated geographical disbursement dictates the required coverage of the system and, to some extent, the frequency band, because of differing propagation characteristics of available bands. The employment of a simplex or duplex repeater system will be dictated by user requirements: Do they need to talk to a central point only, or also among themselves? If information security is a concern, consider frequency allocations that permit digital modulation. The licensing question is complex and generally a predetermined constraint for the designer. If time billing is critical to revenue generation, hardware must be selected to perform this task. The need for interconnection with the private switched telephone network or other radio systems may also be subject to regulatory restraints.



SITE SELECTION

Once the basics have been established (frequency band, simplex vs. duplex, coverage area and transmitter power output, antenna gain and height) the site selection process can commence.

The main options involved in site selection are obtaining land and constructing a tower or renting space on a community tower or rooftop. The latter poses the greatest technical challenge for the system designer. The presence of strong ambient RF from nearby tenants will almost invariably create problems of receiver desensixstization and intermodulation products in your receivers and transmitters and theirs. Receiver desensitization occurs when off-channel RF energy enters the front-end of a receiver and overloads the amplifier circuits, causing a reduction in overall receiver gain or sensitivity. This generally points to inadequate selectivity of the receiver, which must be augmented with external filter devices.

IM

INTERMODULATION

TRANSMITTER NOISE

Transmitter noise is sideband energy, created by the speech amplifier and modulator of a transmitter, which falls outside the permissible channel bandwidth. Regulatory agencies such as the FCC govern the attenuation of these spurious radiations, but improper transmitter adjustment, (overdeviation), lax maintenance (spurring), and the tendency for certain digital modulation techniques (particularly paging) to "splatter," all contribute to this problem.

Receiver-caused intermodulation refers to the RF energy generated by the mixing (heterodyne) action in the non-linear active device (tube or solid-state) of the receiver front end. These IM products may also desensitize the receiver. Usually the third order IM product predominates.

Transmitter-caused intermodulation is similar to that in receivers, and refers to RF energy generated by the mixing action in the transmitter's final amplifier stage. Unless an isolator or other filter device is provided at the transmitter, the transmitting antenna functions very well as a receiving antenna for importing nearby ambient RF and heterodynes nicely with all available frequencies present, intended or otherwise.

Common sense suggests planning for desense and intermod troubles than compensating for them after the system is operational. This is done by obtaining a comprehensive list of all transmit and receive frequencies in use, as well as transmitter power levels, from the site manager.

If your operating frequencies are known, these data can be entered into a computer software package available for intermodulation studies to determine critical frequency combinations in existence, and those potentially created by your equipment. It is very helpful, for example, to know whether a strong intermodulation product exists within your receiver's passband, for there is virtually nothing that can be done to eliminate it other than choosing a different receive frequency. A fine example of "look before you leap."

Intermodulation products can be created virtually anywhere by a non-linear device, such as a receiver's first stage, a transmitter's power output stage, a loose connector, or even a corroded turnbuckle on a guy wire. First, look for the source of the problem. Good engineering practices and prudent maintenance should take care of corrosion problems, dissimilar metal combinations, and transmitter maladjustments. Sometimes the problem can be eliminated by requesting the transmitter's caretaker to re-tune the unit for better (legal) performance. In other instances it can be cured only by equipping another tenant's "offending" transmitter with a cavity resonator. Such solutions may require considerable diplomacy.

In other cases, intermod and desense problem can be cured by equipping your own system's transmitters or receivers with appropriate filters. It's better to identify these needs at the outset, and thereby for the necessary hardware, than to return to the site and employ the "borrow, cut ant try" approach.

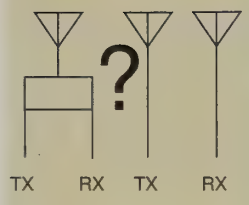
ANTENNAS AND FEEDLINES

ANTENNAS AND FEEDLINES

Antennas and Feedlines need to be selected with great care in order to perform the task expected of them. Because the antenna is the "business end" of the radio system, and probably requires a significant outlay for installation labor, specifications and quality should not be compromised. The wrong choice of gain or radiation pattern, or an inferior quality product, can sabotage an otherwise sound design.

Much myth surrounds the topic of antenna selection, and common mistakes are often repeated. We suggest consulting the "Technical Notes On Antennas" section located on pages 291-295 in this catalog for guidance.

Choice of coaxial feedline is equally critical to system performance. Its job is to route the received and transmitted energy from and to the antenna with a tolerable minimum of energy loss. Charts included in the Cable section of this catalog help you determine the amount of loss to be expected from a specified length of cable in a stated frequency band. When the mobile station's signal strength, receiver quieting, antenna gain, path loss, base station antenna gain and height, transmitter power, and receiver sensitivity are known or assumed, then the amount of tolerable loss, and the diameter of the coaxial cable can be determined. Too small a cable diameter may squander precious signal and render the system useless or grossly sub optimal.



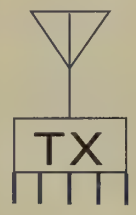
DUPLEXER OR TWO SEPARATE ANTENNAS?

DUPLEXER OR TWO SEPARATE ANTENNAS?

The answer to this question involves the tradeoff between tower "real estate," material and installation cost, and tolerable duplexer insertion loss and cost. Considering the additional wind loading, site charges, and budget strain, dual antennas and lines with adequate physical separation are superior to using a duplexer because the duplexer loss is eliminated. However, the cost of a duplexer can be significantly lower than the initial installation cost and additional monthly site charges associated with a second antenna and line. Usually the argument is resolved in favor of the lower cost solution and a duplexer is specified.

TO COMBINE OR NOT TO COMBINE?

Similar to the duplexer discussion, the tradeoffs of insertion loss and cost must be evaluated. Sometimes a site operator will offer a master antenna via a transmitter combiner port as an alternative to furnishing your own antenna(s) and line(s). Depending on the manufacturer, the design of the combiner and the number of ports, the insertion loss per port can be as high as seven dB. This can mean eighty percent of your transmitter power lost before it reaches the coax! In multi-channel trunking and cellular systems, this magnitude of loss is considered normal. For a UHF community repeater, however, such a power loss could be intolerable. Yet, given individual circumstances, there may be no other alternative. Using a transmitter combiner can "make it happen" where otherwise it would be impossible.



TO COMBINE OR NOT COMBINE?

RECEIVER MULTICOUPLERS

Usually a companion piece to a transmitter combiner, the receiver multicoupler, or "mux," generally provides a front-end filter, amplifier and splitter in order to feed more than one receiver from the same antenna and line. Typically, a net gain is realized for each mux port. Celwave offers enhanced gain and noise specifications through the tower top amplifier preamp option, which is desirable when maximum "talk-in" is essential for system balance.

Product Selection Guide Indexes

These product index pages have been designed to greatly simplify your selection of the large number of products contained in this catalog.

Index #1 arranges groups of products by frequency and provides a quick refernce to application, style, model number and the catalog page where complete product information can be found.

Index#2 is arranged in alpha numerical order. If you know the model number of the product, use this index to locate its page position in the catalog.

INDEX #1: Product Type/Frequency Page 310

INDEX #2: Alpha-Numeric Order Page 318

PRODUCT INDEX

ANTENNA PRODUCTS

Portable Antennas: Eagles

Frequency Range	Applications	Connector	Style	Order #	Page
118-127	Portable	BNC-Male	Helical	B118B	13
118-127	Portable	5/16"-32x1/2" Male	Helical	B118H	13
118-127	Portable	12-28 Female	Helical	B118M	13
118-127	Portable	TNC-Male	Helical	B118T	13
127-136	Portable	BNC-Male	Helical	B127B	13
127-136	Portable	5/16"-32 X 1/2"-Male	Helical	B127H	13
127-136	Portable	12-28-Female	Helical	B127M	13
127-136	Portable	TNC-Male	Helical	B127T	13
136-144	Portable	BNC-Male	Helical	B136B	13
136-144	Portable	5/16"-32x1/2"-Male	Helical	B136H	13
136-144	Portable	12-28-Female	Helical	B136M	13
136-144	Portable	TNC-Male	Helical	B136T	13
144-148	Portable	BNC-Male	Helical	B144B	13
144-148	Portable	5/16"-32 x 1/2"-Male	Helical	B144H	13
144-148	Portable	12-28-Female	Helical	B144M	13
144-148	Portable	TNC-Male	Helical	B144T	13
148-155	Portable	BNC-Male	Helical	B148B	13
148-155	Portable	5/16"-32 x 1/2"-Male	Helical	B148H	13
148-155	Portable	12-28-Female	Helical	B148M	13
148-155	Portable	TNC-Male	Helical	B148T	13
155-164	Portable	BNC-Male	Helical	B155B	13
155-164	Portable	5/16"-32 x 1/2"-Male	Helical	B155H	13
155-164	Portable	12-28-Female	Helical	B155M	13
155-164	Portable	TNC-Male	Helical	B155T	13
164-174	Portable	BNC-Male	Helical	B164B	13
164-174	Portable	5/16"-32 x 1/2"-Male	Helical	B164H	13
164-174	Portable	12-28-Female	Helical	B164M	13
164-174	Portable	TNC-Male	Helical	B164T	13
406-420	Portable	BNC-Male	UHF Helical	C406B	14
406-420	Portable	5/16"-32 x 1/2"-Male	UHF Helical	C406H	14
406-420	Portable	1/4"-32 x 3/16i-Male	UHF Helical	C406X	14
406-420	Portable	TNC-Male	UHF Helical	C406T	14
406-420	Portable	BNC-Male	UHF Qtr. Wave	D406B	14
406-420	Portable	5/16"-32 x 1/2"-Male	UHF Qtr. Wave	D406H	14
406-420	Portable	1/4"-32 x 3/16"-Male	UHF Qtr. Wave	D406X	14
406-420	Portable	TNC-Male	UHF Qtr. Wave	C406T	14
420-450	Portable	BNC-Male	UHF Helical	C420B	14
420-450	Portable	5/16"-32 x 1/2"-Male	UHF Helical	C420H	14
420-450	Portable	1/4"-32 x 3/16"-Male	UHF Helical	C420X	14
420-450	Portable	TNC-Male	UHF Helical	C420T	14
420-450	Portable	BNC-Male	UHF Qtr. Wave	D420B	14
420-450	Portable	5/16"-32 x 1/2"-Male	UHF Qtr. Wave	D420H	14
420-450	Portable	1/4"-32 x 3/16"-Male	UHF Qtr. Wave	D420X	14
420-450	Portable	TNC-Male	UHF Qtr. Wave	D420T	14
450-470	Portable	BNC-Male	UHF Helical	D450B	14
450-470	Portable	5/16"-32 x 1/2"-Male	UHF Helical	C450H	14
450-470	Portable	1/4"-32 x 3/16"-Male	UHF Helical	C450X	14
450-470	Portable	TNC-Male	UHF Helical	C450T	14
450-470	Portable	BNC-Male	UHF Qtr. Wave	D450B	14
450-470	Portable	5/16"-32 x 1/2"-Male	UHF Qtr. Wave	D450H	14
450-470	Portable	1/4"-32 x 3/16"-Male	UHF Qtr. Wave	D450X	14
450-470	Portable	TNC-Male	UHF Qtr. Wave	D450T	14
470-512	Portable	BNC-Male	VHF Qtr Wave	C470B	14
470-512	Portable	5/16"-32 X 1/2 Male	VHF Qtr Wave	C470H	14
470-512	Portable	1/4"-32 X 3/16" Male	VHF Qtr Wave	C470X	14
470-512	Portable	TNC Male	VHF Qtr Wave	C470T	14
470-512	Portable	BNC-Male	UHF Helical	C470B	14
470-512	Portable	5/16"-32 x 1/2"-Male	UHF Qtr. Wave	C470H	14
470-512	Portable	1/4"-32 x 3/16" Male	UHF Qtr. Wave	C470X	14
470-512	Portable	TNC-Male	UHF Qtr. Wave	C470T	14
806-866	Portable	SMA-Female	Half Wave Dipole	G806S	15
806-866	Portable	BNC-Male	Half Wave Dipole	G806B	15
806-866	Portable	SMA-Female	Half Wave Whip	F806S	15
806-866	Portable	SMA-Female	Qtr. Wave Whip	E806S	15
806-866	Portable	TNC-Male	Qtr. Wave Whip	E806T	15
821-890	Portable	Swivel TNC-Male	Half Wave Dipole	G821L	15
821-896	Portable	SMA-Female	Half Wave Dipole	G821S	15
821-896	Portable	BNC-Male	Half Wave Dipole	G821B	15
821-896	Portable	TNC-Male	Half Wave Dipole	G821T	15
821-896	Portable	SMA-Female	Half Wave Whip	F821S	15
821-896	Portable	BNC-Male	Half Wave Whip	F821B	15
821-896	Portable	TNC-Male	Half Wave Whip	F821T	15
821-896	Portable	SMA-Female	Qtr. Wave Whip	E821S	15
821-896	Portable	TNC-Male	Qtr. Wave Whip	E821T	15
824-894	Portable	Right Angle-TNC-Male	Half Wave Dipole	G821R-1	15
872-960	Portable	Right Angle-TNC-Male	Half Wave Dipole	G821R-2	15

Mobile Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
148-174	Transit Heavy Duty	Omni	Unity	Roof Mount	3Mhz	PD1061	16
406-512	Transit Heavy Duty	Omni	Unity	Roof Mount	16Mhz	PD1073	16
450-470	Mobile	Omni	5db	Spring Whip	11Mhz	A43434N	17
806-869	Mobile	Omni	3db	Glass Mount	-	PD806	18
806-890	Transit Heavy Duty	Omni	Unity	Roof Mount	90Mhz	A44008	16
824-894	Mobile	Omni	3db	Glass Mount	-	PD821	18
870-960	Mobile	Omni	3db	Glass Mount	-	PD900	18

Monopole Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
25-88	Emergency Antenna	Cardioid	3.0	Monopole	0.4-66 Mhz	PD206	19
25-512	Emergency Antenna	Omni	Unity	Monopole	0.6-500 Mhz	PD128	19
150-174	Emergency	Cardioid	3.0	Monopole	3.0-150Mhz	PD207	19
279-281	Paging	360/76 H/V	Unity	Monopole	2.0	PD128	52
279-281	Paging	Cardioid	3.0	Monopole	2.0	PD207	52

Coaxial Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
25-54	General	360/75H/V	Unity	Coaxial	0.4	PD1142	27
25-174	General	Omni	Unity	Coaxial	1.0	PD114	25
25-175	General	Omni	Unity	Coaxial	0.5	PD83	25
66-88	General	360/75 H/V	Unity	Coaxial	0.4-0.9	PD1142	26
66-88	General	360/90 H/V	Unity	Coaxial	7.0	PD3010	26

Exposed Dipole Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
30-54	General	Offset	2.5	Exposed Dipole	0.6	PD320	23
30-54	General	Omni/offset	2.5	Exposed Dipole	0.6	PD322	23
30-54	General	Omni/offset	5.0	Exposed Dipole	0.6	PD324	23
66-88	General	Offset	2.5	Exposed Dipole	0.6-1.0	PD320	23
66-88	General	Omni/offset	5.0	Exposed Dipole	0.6-1.0	PD322	23
66-88	General	Omni/offset	Unity 7.5	Exposed Dipole	0.6-1.0	PD324	23
140-174	General	Omni/offset	9/12	Exposed Dipole	12.0	PD654	47
140-174	General	Omni/offset	6/9	Exposed Dipole	12.0	PD340	49
140-174	General	Omni/offset	3/6	Exposed Dipole	12.0	PD345	49
140-174	General	Omni/offset	3/6	Exposed Dipole	12.0	PD440	49
144-178	General	Ofst/80 H/V	3.0	Exposed Dipole	6.0	PD1121	45
148-174	General	Ofst/60 H/V	4.5	Exposed Dipole	4.5	PD344	46

Collinear Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
30-54	General	Collinear	3.0	Collinear	0.8	PD315-2	28
66-88	General	360/38H/V	3.0	Collinear	0.8-1.5	PD315-3	28

Yagi Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
66-88	Point to Point	80/58 H/V	7.0	Yagi	1.5-4.0	PD156S	30
66-88	Point to Point	40/58 H/V	9.3	Yagi	1.5-.4	PD156D	32
144-174	Point to Point	40/58 H/V	9.3	Yagi	1.5-4.0	PD156D	32

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
144-225	Point to Point	72/52/H/V	.8	Yagi	8.0	PD390S	30
144-225	Point to Point	36/52/H/V	11.0	Yagi	8.0	PD390D	32
150-174	Point to Point	80/58 H/V	7.0	Yagi	1.5-4.0	PD156S	30
150-174	Point to Point	62/48 H/V	9.0	Yagi	10.0	PD1158S	30
150-174	Point to Point	31/48 H/V	12.0	Yagi	10.0	PD1158D	32
279-281	Paging	80/58 H/V	7.0	Yagi	2.0	PD156S	52
406-512	Point to Point	50/40 H/V	10.0	Yagi	20.0	PD688S	68
406-512	Point to Point	24/40 H/V	13.0	Yagi	20.0	PD688D	68
806-960	SMR/Cel/Paging	105/66H/V	5.5	Yagi	60.0+	PD10212	125
806-960	SMR/Cel/Paging	50/42H/V	10.0	Yagi	80.0	PD10108	127
806-960	SMR/Cel/Paging	22/42H/v	13.0	Yagi	80.0	PD10108D	127

Ground Plane Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
108-174	Air General	OMNI	Unity	Ground Plane	24.0	PD453	34
108-512	Air General	OMNI	Unity	Ground Plane	12.0	PD152	34

Fiberglass Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
118-171	General	OMNI	3.0	Fiberglass	6.0	BA1312	36
118-174	General	OMNI	Unity	Fiberglass	18.0	BA1012	36
120-174	General	360/18 H/V	5.8	Fiberglass	1.5	PD200	42
136-174	General	360/18 H/V	5.25	Fiberglass	8.0	PD220	40
136-174	General	OMNI	5.0	Fiberglass	1.5	PD220DT	40
136-174	General	OMNI	5.25	Fiberglass	8.0	PD620DT	40
136-174	General	OMNI	5.0	Fiberglass	1.5	PD620T	40
144-174	General	360/36 H/V	3.0	Fiberglass	6.0	PD1167	47
146-174	General	360/90 H/V	Unity	Fiberglass	18.0	BA1010	36
216-225	General	360/18 H/V	5.25	Fiberglass	8.0	PD220	40
279-281	Paging	360/76H/V	Unity	Fiberglass	2.0	PD10191	54
279-281	Paging	360/36H/V	3.0	Fiberglass	2.0	PD10204	54
406-512	General	360/66 H/V	Unity	Fiberglass	70.0	BA6110	56
406-512	General	360/18 H/V	5.0	Fiberglass	10.0	PD201	59
406-512	General	360/18 H/V	5.0	Fiberglass	10.0	PD1150	56
406-512	General	360/12 H/V	7.5	Fiberglass	8.0	PD400	61
406-512	General	360/12 H/V	8.0	Fiberglass	10.0	PD1151	61
406-512	General	360/12 H/V	8.0	Fiberglass	14.0-24.0	PD458	63
406-512	General	360/7 H/V	10.0	Fiberglass	10.0	PD455	65
406-512	General	360/7 H/V	9.5	Fiberglass	8.0	PD455DT	65
406-512	General	360/7 H/V	10.0	Fiberglass	10.0	PD755	65
406-512	General	360/7 H/V	9.5	Fiberglass	8.0	PD755DT	65
449-503	General	OMNI	3.0	Fiberglass	18.0	BA6312	56
449-612	General	OMNI	Unity	Fiberglass	20.0	BA6012	56
806-866	SMR	OMNI	3.0	Fiberglass	60.0	Cel-1A	87
806-866	SMR	OMNI	6.0	Fiberglass	60.0	Cel-3A	87
806-945	SMR/Cel/Paging	OMNI/Collinear	3db	Fiberglass	70.0	PD1610	95
806-960	SMR/Cel/Paging	OMNI	Unity	Fiberglass	70.0	PD10022	95
806-960	SMR/Cel/Paging	360/12H/V	5.0	Fiberglass	60.0	PD1108	88
806-960	SMR/Cel/Paging	360/8H/V	7.5	Fiberglass	60.0	PD1109	88
806-960	SMR/Cel/Paging	360/8H/V	7.5	Fiberglass	60.0	PD10041	88
806-960	SMR/Cel/Paging	360/6H/V	9.0	Fiberglass	35.0	PD1110	88
806-960	SMR/Cel/Paging	360/6H/V	10.0	Fiberglass	35.0	PD10017	88
806-960	Cellular	OMNI/Collinear	10.0	Fiberglass	63.0	A08410	91
824-894	Cellular	OMNI/Collinear	7.5	Fiberglass	70.0	PD1109E	88
824-894	Cellular	OMNI/Collinear	7.5	Fiberglass	70.0	10041E	88
824-894	Cellular	OMNI/Collinear	10.0	Fiberglass	70.0	A08610	91
825-890	Control Station	OMNI	3.0	Fiberglass	65.0	Cel 1	87
825-890	Control Station	OMNI	6.0	Fiberglass	65.0	Cel 3	87
870-960	SMR/Cel/Paging	OMNI	10.0	Fiberglass	90.0	A09210	91
890-960	Amps/TACS	OMNI	9.0	Fiberglass	70.0	A09009	93
901-941	PCN/900 Paging	Collinear	6.0	Fiberglass	7.0	PCN6	97
901-941	PCN/900 Paging	Collinear	9.0	Fiberglass	5.0	PCN9	97
1710-1880	DECT/PCS	OMNI	3.0	Fiberglass	170.0	A01803	129
1710-1880	DECT/PCS	OMNI	9.0	Fiberglass	170.0	A01809	131
1719-1880	DECT/PCS	OMNI	12.0	Fiberglass	170.0	A01812	131
1850-1990	DECT/PCS	OMNI	3/5.1	Fiberglass	140.0	A01903	129
1850-1990	DECT/PCS	OMNI	9/11	Fiberglass	140.0	A01909	131

Penetrator Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
406-420	General	140 °	10.0	Penetrator	14.0	AGR6B	75
406-420	General	140 °	12.0	Penetrator	14.0	AGR8B	75
406-420	General	140 °	13.0	Penetrator	14.0	AGR9B	75
406-420	General	220 °	8.3	Penetrator	14.0	AGR6A	75
406-420	General	220 °	10.3	Penetrator	14.0	AGR8A	75
406-420	General	220 °	11.3	Penetrator	14.0	AGR9A	75
406-420	General	360 °	6.0	Penetrator	14.0	AGR6	75
406-420	General	360 °	8.0	Penetrator	14.0	AGR8	75
406-420	General	360 °	9.0	Penetrator	14.0	AGR9	75
450-482	General	140 °	10.0	Penetrator	32.0	ALR6B	76
450-482	General	140 °	12.0	Penetrator	32.0	ALR8B	76
450-482	General	140 °	14.0	Penetrator	32.0	ALR10B	76
450-482	General	220 °	8.3	Penetrator	32.0	ALR6A	76
450-482	General	220 °	10.3	Penetrator	32.0	ALR8A	76
450-482	General	220 °	12.3	Penetrator	32.0	ALR10A	76
450-482	General	360 °	6.0	Penetrator	32.0	ALR6	76
450-482	General	360 °	8.0	Penetrator	32.0	ALR8	76
450-482	General	360 °	10.0	Penetrator	32.0	ALR10	76
470-512	General	140 °	10.0	Penetrator	42.0	AHR6B	76
470-512	General	140 °	12.0	Penetrator	42.0	AHR8B	76
470-512	General	140 °	14.0	Penetrator	42.0	AHR10B	76
470-512	General	220 °	8.3	Penetrator	42.0	AHR6A	76
470-512	General	220 °	10.3	Penetrator	42.0	AHR8A	76
470-512	General	220 °	12.3	Penetrator	42.0	AHR10A	76
470-512	General	360 °	6.0	Penetrator	42.0	AHR6	76
470-512	General	360 °	8.0	Penetrator	42.0	AHR8	76
470-512	General	360 °	10.0	Penetrator	42.0	AHR10	76
806-906	SMR/Cell	120 °	14.3	Penetrator	100.0	BMS10D	81
806-906	SMR/Cell	120 °	16.3	Penetrator	100.0	BMS12D	81
806-906	SMR/Cell	140 °	14.0	Penetrator	100.0	BMS10B	81
806-906	SMR/Cell	140 °	16.0	Penetrator	100.0	BMS12B	81
806-906	SMR/Cell	220 °	12.3	Penetrator	100.0	BMS10A	81
806-906	SMR/Cell	220 °	14.3	Penetrator	100.0	BMS12A	81
806-906	SMR/Cell	2 Sctr	13.4	Penetrator	100.0	BMS10H	81
806-906	SMR/Cell	2 Sctr	15.4	Penetrator	100.0	BMS12H	81
806-906	SMR/Cell	360 °	10.0	Penetrator	100.0	BMS10	81
806-906	SMR/Cell	360 °	12.0	Penetrator	100.0	BMS12	81
806-869	SMR	120 °	10.3	Penetrator	63.0	BMR6D	77
806-869	SMR	120 °	12.3	Penetrator	63.0	BMR8D	77
806-869	SMR	120 °	14.3	Penetrator	63.0	BMR10D	79
806-869	SMR	120 °	16.3	Penetrator	63.0	BMR12D	79
806-869	SMR	140 °	10.0	Penetrator	63.0	BMR6B	77
806-869	SMR	140 °	12.0	Penetrator	63.0	BMR8B	77
806-869	SMR	140 °	14.0	Penetrator	63.0	BMR10B	79
806-869	SMR	140 °	16.0	Penetrator	63.0	BMR12B	79
806-869	SMR	220 °	8.3	Penetrator	63.0	BMR6A	77
806-869	SMR	220 °	10.3	Penetrator	63.0	BMR8A	77
806-869	SMR	220 °	12.3	Penetrator	63.0	BMR10A	79
806-869	SMR	220 °	14.3	Penetrator	63.0	BMR12A	79
806-869	SMR	2 Sctr	9.4	Penetrator	63.0	BMR6H	77
806-869	SMR	2 Sctr	11.4	Penetrator	63.0	BMR8H	77
806-869	SMR	2 Sctr	13.4	Penetrator	63.0	BMR10H	79
806-869	SMR	2 Sctr	15.4	Penetrator	63.0	BMR12H	79
806-869	SMR	360 °	6.0	Penetrator	63.0	BMR6	77
806-869	SMR	360 °	8.0	Penetrator	63.0	BMR8	77
806-869	SMR	360 °	10.0	Penetrator	63.0	BMR10	79
806-869	SMR	360 °	12.0	Penetrator	63.0	BMR12	79
806-869	SMR	120 °	12.3-10.3	Penetrator	63.0	BMR8/6D	83
806-869	SMR	120 °	14.3-12.3	Penetrator	63.0	BMR10/8D	85
806-869	SMR	140 °	12.0-10.	Penetrator	63.0	BMR8/6B	83
806-869	SMR	140 °	14.0-12	Penetrator	63.0	BMR10/8B	85
806-869	SMR	220 °	10.3-8.3	Penetrator	63.0	BMR8/6A	83
806-869	SMR	220 °	12.3-10.3	Penetrator	63.0	BMR10/8A	85
806-869	SMR	2 Sctr	11.4 - 9.4	Penetrator	63.0	BMR8/6H	83

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
806-869	SMR	2 Sctr	13.4 - 11.4	Penetrator	63.0	BMR10/8H	85
806-869	SMR	360 °	8-6	Penetrator	63.0	BMR8/6	83
806-869	SMR	360 °	10-8	Penetrator	63.0	BMR10/8	85
824-894	Cell/Page	120 °	10.3	Penetrator	70.0	BCR6D	77
824-894	Cell/Page	120 °	12.3	Penetrator	70.0	BCR8D	77
824-894	Cell/Page	120 °	14.3	Penetrator	70.0	BCR10D	79
824-894	Cell/Page	120 °	16.3	Penetrator	70.0	BCR12D	79
824-894	Cell/Page	140 °	10.0	Penetrator	70.0	BCR6B	77
824-894	Cell/Page	140 °	12.0	Penetrator	70.0	BCR8B	77
824-894	Cell/Page	140 °	14.0	Penetrator	70.0	BCR10B	79
824-894	Cell/Page	140 °	16.0	Penetrator	70.0	BCR12B	79
824-894	Cell/Page	220 °	8.3	Penetrator	70.0	BCR6A	77
824-894	Cell/Page	220 °	10.3	Penetrator	70.0	BCR8A	77
824-894	Cell/Page	220 °	12.3	Penetrator	70.0	BCR10A	79
824-894	Cell/Page	220 °	14.3	Penetrator	70.0	BCR12A	79
824-894	Cell/Page	2 Sctr	9.4	Penetrator	70.0	BCR6H	77
824-894	Cell/Page	2 Sctr	11.4	Penetrator	70.0	BCR8H	77
824-894	Cell/Page	2 Sctr	13.4	Penetrator	70.0	BCR10H	79
824-894	Cell/Page	2 Sctr	15.4	Penetrator	70.0	BCR12H	79
824-894	Cell/Page	360 °	6.0	Penetrator	70.0	BCR6	77
824-894	Cell/Page	360 °	8.0	Penetrator	70.0	BCR8	77
824-894	Cell/Page	360 °	10.0	Penetrator	70.0	BCR10	79
824-894	Cell/Page	360 °	12.0	Penetrator	70.0	BCR12	79
824-894	Cellular	120 °	12.3-10.3	Penetrator	70.0	BCR8/6D	83
824-894	Cellular	120 °	14.3-12.3	Penetrator	70.0	BCR10/8D	85
824-894	Cellular	140 °	12.0-10.0	Penetrator	70.0	BCR8/6B	83
824-894	Cellular	140 °	14.0-12.0	Penetrator	70.0	BCR10/8B	85
824-894	Cellular	222 °	10.3-8.3	Penetrator	70.0	BCR8/6A	83
824-894	Cellular	222 °	12.3 - 10.3	Penetrator	70.0	BCR10/8A	85
824-894	Cellular	2 Sctr	11.4-9.4	Penetrator	70.0	BCR8/6N	83
824-894	Cellular	2 Sctr	13.4 - 11.4	Penetrator	70.0	BCR10/8N	85
824-894	Cellular	360 °	8.0-6.0	Penetrator	70.0	BCR8/6	83
824-894	Cellular	360 °	10.0-8.0	Penetrator	70.0	BCR10/8	85
850-950	Cell/Page	120 °	14.3	Penetrator	100.0	BMS10D	81
850-950	Cell/Page	120 °	16.3	Penetrator	100.0	BMS12D	81
850-950	Cell/Page	140 °	14.0	Penetrator	100.0	BMS10B	81
850-950	Cell/Page	140 °	16.0	Penetrator	100.0	BMS12B	81
850-950	Cell/Page	220 °	12.3	Penetrator	100.0	BMS10A	81
850-950	Cell/Page	220 °	14.3	Penetrator	100.0	BMS12A	81
850-950	Cell/Page	2 Sctr	13.4	Penetrator	100.0	BMS10H	81
850-950	Cell/Page	2 Sctr	15.4	Penetrator	100.0	BMS12H	81
850-950	Cell/Page	360 °	10.0	Penetrator	100.0	BMS10	81
850-950	Cell/Page	360 °	12.0	Penetrator	100.0	BMS12	81
850-950	Multi-Service	120 °	14.3	Penetrator	100.0	BMS10D	81
850-950	Multi-Service	120 °	16.3	Penetrator	100.0	BMS12D	81
850-950	Multi-Service	140 °	14.0	Penetrator	100.0	BMS10B	81
850-950	Multi-Service	140 °	16.0	Penetrator	100.0	BMS12B	81
850-950	Multi-Service	220 °	12.3	Penetrator	100.0	BMS10A	81
850-950	Multi-Service	220 °	14.3	Penetrator	100.0	BMS12A	81
850-950	Multi-Service	2 Sctr	13.4	Penetrator	100.0	BMS10H	81
850-950	Multi-Service	2 Sctr	15.4	Penetrator	100.0	BMS12H	81
850-950	Multi-Service	360 °	10.0	Penetrator	100.0	BMS10	81
850-950	Multi-Service	360 °	12.0	Penetrator	100.0	BMS12	81
928-960	Cell/Page	120 °	10.3	Penetrator	32.0	BPR6D	77
928-960	Cell/Page	120 °	12.3	Penetrator	32.0	BPR8D	77
928-960	Cell/Page	120 °	14.3	Penetrator	32.0	BPR10D	79
928-960	Cell/Page	120 °	16.3	Penetrator	32.0	BPR12D	79
928-960	Cell/Page	140 °	10.0	Penetrator	32.0	BPR6B	77
928-960	Cell/Page	140 °	12.0	Penetrator	32.0	BPR8B	77
928-960	Cell/Page	140 °	14.0	Penetrator	32.0	BPR10B	79
928-960	Cell/Page	140 °	16.0	Penetrator	32.0	BPR12B	79
928-960	Cell/Page	220 °	8.3	Penetrator	32.0	BPR6A	77
928-960	Cell/Page	220 °	10.3	Penetrator	32.0	BPR8A	77
928-960	Cell/Page	220 °	12.3	Penetrator	32.0	BPR10A	79
928-960	Cell/Page	220 °	14.3	Penetrator	32.0	BPR12A	79
928-960	Cell/Page	2 Sctr	9.4	Penetrator	32.0	BPR6H	77
928-960	Cell/Page	2 Sctr	11.4	Penetrator	32.0	BPR8H	77
928-960	Cell/Page	2 Sctr	13.4	Penetrator	32.0	BPR10H	79
928-960	Cell/Page	2 Sctr	15.4	Penetrator	32.0	BPR12H	79
928-960	Cell/Page	360 °	6.0	Penetrator	32.0	BPR6	77
928-960	Cell/Page	360 °	8.0	Penetrator	32.0	BPR8	77
928-960	Cell/Page	360 °	10.0	Penetrator	32.0	BPR10	79
928-960	Cell/Page	360 °	12.0	Penetrator	32.0	BPR12	79
928-960	Paging	120 °	12.3-10.3	Penetrator	32.0	BPR8/6D	83
928-960	Paging	120 °	14.3-12.3	Penetrator	32.0	BPR10/8D	85
928-960	Paging	140 °	12.0-10.0	Penetrator	32.0	BPR8/6B	83
928-960	Paging	140 °	14.0-12.0	Penetrator	32.0	BPR10/8B	85
928-960	Paging	220 °	10.3-8.3	Penetrator	32.0	BPR8/6A	83
928-960	Paging	220 °	12.3-10.3	Penetrator	32.0	BPR10/8A	85
928-960	Paging	2 Sctr	11.4-9.4	Penetrator	32.0	BPR8/6H	83
928-960	Paging	2 Sctr	13.4-11.4	Penetrator	32.0	BPR10/8H	85
928-960	Paging	360 °	8.0-6.0	Penetrator	32.0	BPR8/6	83
928-960	Paging	360 °	10.0-8.0	Penetrator	32.0	BPR10/8	85

Panel Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
400-520	General	65/65 H/V	7.3	Panel	40.0	PD10054	70
400-520	General	65/35 H/V	10.	Panel	40.0	PD10055	70
806-960	Cellular	60 °	7.0	Panel	154.0	AP886007	105
806-960	Cellular	120 °	4.5	Panel	154.0	AP881205	119
806-960	Cellular	120 °	7.5	Panel	154.0	AP881208	119
820-900	Amps/TACS	37 °	12.2	Panel	80.0	AP863712	103
820-900	Amps/TACS	37 °	15.2	Panel	80.0	AP863715	103
820-900	Cellular	100 °	11.0	Panel	80.0	AP861011	113
820-900	Amps/TACS	100 °	14.0	Panel	70.0	AP861014	115
824-960	Cellular	65°	10.0	Panel	136.0	AP906510	109
824-960	Cellular	65°	13.0	Panel	136.0	AP906513	109
824-960	Cellular	65°	16.0	Panel	136.0	AP906516	109
824-960	Cellular	90°	8.5	Panel	136.0	AP909009	111
824-960	Cellular	90°	11.0	Panel	136.0	AP909011	111
824-960	Cellular	90°	13.5	Panel	136.0	AP909014	111
824-960	Cellular	105°	8.0	Panel	91.0	AP901008	117
824-960	Cellular	105°	11.0	Panel	91.0	AP901011	117
824-960	Cellular	105°	13.0	Panel	91.0	AP901013	117
824-960	Cellular	120°	7.5	Panel	136.0	AP901208	121
824-960	Cellular	120°	10.0	Panel	136.0	AP901210	121
824-960	Cellular	120°	12.5	Panel	136.0	AP901213	121
824-894	Cellular	60°	17.0	Panel	70.0	AP866017	107
824-894	Cellular	Variable	8.2-11.6	Panel	70.0	APV864612	123
824-894	Cellular	Variable	11.2-14.6	Panel	70.0	APV864615	123
872-950	SMR/Cel/Paging	60 °	17.0	Panel	78.0	AP916017	107
890-960	Amps/TACS	60 °	17.0	Panel	70.0	AP926017	107
1710-1990	DCS/PCS	33 °	12.0	Panel	280.0	AP183312	133
1710-1990	DCS/PCS	33 °	15.0	Panel	280.0	AP183315	133
1710-1990	DCS/PCS	33 °	17.0	Panel	280.0	AP183317	133
1710-1990	DCS/PCS	65 °	8.0	Panel	280.0	AP186508	135
1710-1990	DCS/PCS	65 °	12.0	Panel	280.0	AP186512	135
1710-1990	DCS/PCS	65 °	15.0	Panel	280.0	AP186515	135
1710-1990	DCS/PCS	65 °	16.0	Panel	280.0	AP186516	135
1710-1990	DCS/PCS	90 °	6.0	Panel	280.0	AP189006	137
1710-1990	DCS/PCS	90 °	10.0	Panel	280.0	AP189010	137
1710-1990	DCS/PCS	90 °	14.0	Panel	280.0	AP189014	137
1710-1990	DCS/PCS	90 °	15.5	Panel	280.0	AP189015	137
1710-1990	DCS/PCS	120 °	13.0/15.0	Panel	280.0	AP181213	139

Corner Reflector Antennas

Frequency	Applications	Pattern	Gain	Style	Bandwidth	Order #	Page
806-960	SMR/Cel/Paging	60 °	8.0	CornerRef	80.0 or 90.0	PD10040	101
806-960	SMR/Cel/Paging	46 °	9.0	CornerRef	80.0 or 90.0	PD1124	101

TRANSMISSION LINE

Transmission Line

Diameter Inches	Foam, Radiating or Air	Cable Type Number	Order #	Page
1/4	Foam	S-FLC14-50J	811028-001	152, 160
1/4	Foam	S-FLC14-50J	811028-007	156, 160
1/4	Foam	R-FLC14-50J	811041-001	156, 160
1/4	Radiating	R-FLC14-50JFR	811041-003	156, 160
1/4	Radiating	R-FLC14-50JFRT	811041-007	156, 160
3/8	Radiating	R-FLC38-50J	811032-001	156, 160
3/8	Radiating	R-FLC38-50JFR	811032-003	156, 160
3/8	Radiating	R-FLC-50JFRT	811032-007	156, 160
1/2	Foam	S-FLC12-50J	811026-001	156, 160
1/2	Foam	S-FLC12-50J	811026-007	156, 160
1/2	Foam	FLC12-50J	810918-001	156, 160
1/2	Foam	FLC12-50J	810918-007	156, 160
1/2	Air	HCC12-50J	810901-001	156, 160
1/2	Radiating	R1-FLC12-50J	811033-001	156, 160
1/2	Radiating	R1-FLC12-50JFR	811033-003	156, 160
1/2	Radiating	R1-FLC12-50JFRT	811033-007	156, 160
1/2	Radiating	RT2-FLC12-50J	811034-001	156, 160
1/2	Radiating	RT2-FLC12-50JFR	811034-003	156, 160
1/2	Radiating	RT2-FLC12-50JFRT	811034-007	156, 160
1/2	Radiating	RT3-FLC12-50J	811035-101	156, 160
1/2	Radiating	RT3-FLC12-50JFR	811035-103	156, 160
1/2	Radiating	RT3-FLC12-50JFRT	811035-107	156, 160
7/8	Foam	FLC78-50J	810921-001	152, 160
7/8	Foam	FLC78-50J	810921-007	152, 160
7/8	Air	HCC78-50J	810929-001	152, 160
7/8	Radiating	R-FLC78-50J	811036-001	152, 160
7/8	Radiating	R-FLC78-50JFR	811036-003	152, 160
7/8	Radiating	R-FLC78-50JFRT	811036-007	152, 160
1 1/4	Foam	FLC114-50J	810916-001	152, 160
1 1/4	Foam	FLC114-50J	810916-007	152, 160
1 1/4	Radiating	R-FLC114-50J	811037-001	152, 160
1 1/4	Radiating	R-FLC114-50JFR	811037-003	152, 160
1 1/4	Radiating	R-FLC114-50JFRT	811037-007	152, 160
1 5/8	Air	HCC158-50J	810903-001	152, 160
1 5/8	Radiating	R-FLC158-50J	811038-001	152, 160
1 5/8	Radiating	R-FLC158-50JFR	811038-003	152, 160
1 5/8	Radiating	R-FLC158-50JFRT	811038-007	152, 160
3	Air	HCC300-50J	810905-001	152, 160

Connectors

Size Inches	Cable Type	Connector Type	Order #	Page
1/4	Foam	N-Male	734769	154, 162
1/4	Foam	N-Female	734770	154, 162
1/4	Radiating	N-Male	734769	154, 162
1/4	Radiating	N-Female	734770	154, 162
1/2	Foam	N-Male	734701	154, 162
1/2	Foam	N-Female	734710	154, 162
1/2	Foam	N-Male	738802	154, 162
1/2	Foam	N-Female	738801	154, 162
1/2	Foam	UHF-Male	738804	154, 162
1/2	Foam	UHF-Female	738803	154, 162
1/2	Foam	7/8" EIA	738807	154, 162
1/2	Foam	Splice	738806	154, 162
1/2	Air	N-Male	738200	154, 162
1/2	Air	N-Female	738201	154, 162
1/2	Air	Splice	738204	154, 162
1/2	Radiating	N-Male	738802	154, 162
1/2	Radiating	N-Female	738801	154, 162
1/2	Radiating	UHF-Male	738804	154, 162
1/2	Radiating	UHF-Female	738803	154, 162
1/2	Radiating	Splice	738806	154, 162
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3/8	Radiating	N-Female	734762	154, 162
3/8	Radiating	UHF-Male	734773	154, 162
3/8	Radiating	UHF-Female	734774	154, 162
3/8	Radiating	Splice	734777	154, 162
7/8	Foam	N-Male	738841	154, 162
7/8	Foam	N-Female	738842	154, 162
7/8	Foam	UHF-Male	738843	154, 162
7/8	Foam	UHF-Female	738844	154, 162
7/8	Foam	7/8" EIA	738845	154, 162
7/8	Foam	End Terminal	738847	154, 162
7/8	Foam	Splice	738846	154, 162
7/8	Air	N-Male	738225	154, 162
7/8	Air	N-Female	738226	154, 162
7/8	Air	7/8" EIA(GP)	738230	154, 162
7/8	Air	7/8" EIA(GB)	738229	154, 162
7/8	Air	Splice	738231	154, 162
7/8	Air	End Terminal	738232	154, 162
7/8	Radiating	N-Male	738841	154, 162
7/8	Radiating	N-Female	738842	154, 162
7/8	Radiating	UHF-Male	738843	154, 162
7/8	Radiating	UHF-Female	738844	154, 162
7/8	Radiating	Splice	738846	154, 162
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1 1/4	Foam	N-Female(GP)	738883/738889	154, 162
1 1/4	Foam	7/8" EIA(GP)	738880	154, 162
1 1/4	Foam	1 5/8" EIA(GP)	738881	154, 162
1 1/4	Foam	Splice	738885	154, 162
1 1/4	Radiating	N-Male	738882	154, 162
1 1/4	Radiating	N-Female	738883	154, 162
1 1/4	Radiating	Splice	738885	154, 162
1 5/8	Foam	N-Male	738850	154, 162
1 5/8	Foam	N-Female	738851	154, 162
1 5/8	Foam	7/8" EIA(GP)	738854	154, 162
1 5/8	Foam	1 5/8" EIA(GP)	738853	154, 162
1 5/8	Foam	Splice	738855	154, 162
1 5/8	Air	N-Female	738301	154, 162
1 5/8	Air	1 5/8" EIA(GP)	738314	154, 162
1 5/8	Air	1 5/8" EIA(GB)	738303	154, 162
1 5/8	Air	7/8" EIA(GB)	738304	154, 162
1 5/8	Air	7/8" EIA(GP)	738311	154, 162
1 5/8	Air	End Terminal	738306	154, 162
1 5/8	Air	Splice	738305	154, 162
1 5/8	Radiating	N-Male	738850	154, 162
1 5/8	Radiating	N-Female	738851	154, 162
1 5/8	Radiating	Splice	738855	154, 162
3	Air	3 1/8" EIA(GP)	738355	154, 162
3	Air	3 1/8" EIA(GB)	738350	154, 162
3	Air	Splice	738352	154, 162

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CAVITIES

Cavities

Frequency Range	Type Filter	Power Max	Ins. Loss dB	Dia. in.	Order #	Page
30-39	BP	350	0.5-2.0	12"	PD644	167
39-50	BP	350	0.5-2.0	12"	PD645	167
66-88	BP	350	0.5-1.5	12"	PD1185	167
66-88	BP	400	0.3	6"	PD505-0	173
66-88	BP	350	0.5-1.5	6"	PD500-0	171
88-118	BP	350	0.5-1.5	6"	PD500-0S	171
118-136	BP	350	0.5-1.5	6"	PD500-1S	171
136-174	BP	500	0.5-1.5	12"	PD1186	167
136-174	BP	350	0.5-1.5	6"	PD5090	171

Frequency Range	Type Filter	Power Max	Ins. Loss dB	Dia. in.	Order #	Page
136-174	PR	400	0.3-0.8	6"	PD5091	173
136-174	Notch	400	0.5	6"	PD1147	175
148-174	HiQ BP	350	0.5	8-5/32	PD5013-B	169
200-300	BP	300	0.5-2.0	6"	PD500-2	171
275-300	HiQ BP	125	1.5	8"	PD5013-E	169
300-406	BP	300	0.5-1.5	6"	PD500-3	171
406-512	BP	500	0.5-1.5	12"	PD1187	167
406-512	BP	300	0.5-1.5	6"	PD500-4	171
406-512	PR	400	0.3-0.8	6"	PD505-4	173
406-512	PR	250	0.3-0.8	4"	PD695	173
406-512	PR	350	0.6-0.8	6"	PD1155	173
406-512	Notch	350	0.5	6"	PD1148	175
406-512	Notch	350	0.5	6"	PD1153	175
440-512	HiQ BP	350	0.5	8-5/32	PD5013-A	169
806-960	BP	250	0.5-1.5	6"	PD500-8	171
806-960	PR	100	0.5	4"	PD895	173

FILTERS

Filters

Frequency Range	Type	Insertion Loss	Bandwidth	Order #	Page
66-88	Comp.Pre.	2	1.5	PD901-PB4	176
144-174	Comp.Pre.	1.5/2.25	4-2	PD911-PB4	176
406-474	Comp.Pre	1/1.5	6-3	PD941-PB4	176
406-512	BandPass	1.5	2	PD5044-4	178
406-512	BandPass	1.0	4	PD5044-4	178
406-512	UHF Rx	1.5	5	PD5102-6-5	180
450-470	UHF Rx	2.5	4	PD5102-6-4NF	180
450-470	UHF Rx	3(Max)	Dual 4	PD5102-6-4NFD	180
474-512	Comp.Pre.	1/1.5	6-3	PD951-PB4	176
806-960	BandPass	1.0	15	PD5044-8	178
806-960	BandPass	1.5	5	PD5044-8	178
806-960	BandPass	0.8	20	PD5044-8	178
806-960	BandPass	0.8	25	PD5044-8	178
824-846.5	Cell. Preselect.	1.0	22.5	CFX836-6N	189
824-846.5	Cell. Preselect.	1.5	22.5	CFX836-8N	189
824-849	Cell. Preselect.	1.0	25	CFX836-8W	189
824-849	Cell. Preselect	1.5	14	CFX842-6	189
824-849	Cell. Preselect	1.4	14	CFX842-8	189
835-849	Wireline Rx	3.5 Max	14	PD5094-14Ba	185
835-849	WirelineRx	.95-1.6Max	14	PD5198	187
869-894	Cellular Tx	<.50	25	PD5192-25N	183
869-894	Cellular Tx	<.50	25	PD5192-25L	183
880-894	Cellular Tx	<.50	14	PD5192-14N	183
880-894	Cellular Tx	<.50	14	PD5192-14L	183
890-960	GSM/EGSM Duplex	40	25	FD9042-1	191
890-960	GSM/EGSM Duplex	30	25	FD9042-2	191
896-902	Combline BP	1.5	6	PD5182-1	188
1805-1880	DCS & PCS Tx Bp	1.2	-	FB18102-1	196
1930-1990	DCS-PCS TX-BP	1.2	-	FB19102-1	196

DUPLEXERS

Duplexers

Frequency Range	Type Duplexer	Power Max	Tx-Rx Separation	Insertion Loss Tx-Ant	Insertion Loss Rx-Ant.	Connectors	Order #	Page
66-88	Dual Notch	180	.500	1.5	1.5		PD506-0	197
66-88	Dual Notch	350	1.0	1.2	1.2	N(F)	PD506-0	197
66-88	Dual Notch	350	.500	1.0	1.0	N(F)	PD497-0	199
66-88	Compact Base	100	5-10	1.2	1.2	N(F)	PD638-6-0	201
136-174	Dual Notch	180	.600	2.0	2.0	N(F)	PD506-1	197
136-174	Dual Notch	350	5	0.8	0.8	N(F)	PD506-1	197
136-174	Dual Notch	350	.500	1.0	1.0	N(F)	PD497-1	199
136-174	Dual Notch	200	.500	2.0	2.0	N(F)	PD497-1	199
136-174	Dual Notch	350	2.0	1.0	1.0	N(F)	PD497-1	199
138-174	Dual Notch	100	.5	1.8	1.8	N(F)	PD5042-1	207
138-174	Dual Notch	350	≥5.0	1.0	1.0	N(F)	PD5042-1	207
138-174	Compact Base	100	1.4(Max)	1.4 (Max)	1.4 (Max)	N(F)	PD5085	201
144-160	Miniplexer P-R	50	4.5	1.3	1.3	BNC(F)	PD7340	203
144-160	Minplexer P-R	50	4.5	1.5	.5	BNC(F)	PD7360	203
144-175	VHF Compact	50	4.5	0.8	0.8	BNC(F)	PD636A	205
144-175	VHF Compact	50	4.5	1.2	1.2	BNC(F)	PD636-6A	205
150-174	Compact Base	150	3-5	1.2	1.2	N(F)	PD638-6-1	201
155-174	Dual Notch	100	1.6	1.3	1.3	N(F)	PD5042-2	207
155-174	Compact Base	100	1.6	1.8	1.8	N(F)	PD638-6-2	201
155-174	Miniplexer P-R	50	4.5	1.3	1.3	BNC(F)	PD7440	203
155-174	Miniplexer P-R	50	4.5	1.5	1.5	BNC(F)	PD7460	203
220-225	Dual Notch	300	1.6	1.0	1.0	N(F)	PD506-2	197
355-512	UHF Mobile	50	10	1.2	1.2	BNC(F)	PD633-6A	208
406-440	Miniplexer P-/R	50	5/10	1.5/1.2	1.5/1.2	BNC(F)	PD7560	213
406-470	Compact Base	100	5/12	1.2	1.2	N(F)	PD638-6-4	201
406-470	Compact Base	100	5-12	0.8	0.8	N(F)	PD638	201
406-470	DuNotch/Hi Sel	250	5(Min)	1.0	1.0	N(F)	PD526-4	210
406-512	Dual Notch	200	.500	2.2	2.2	N(F)	PD1157	199
406-512	Dual Notch	250	4-12	0.8	0.8	N(F)	PD696-1	211
406-512	Dual Notch	150	2.5-3.5	1.2	1.2	N(F)	PD696-2	211
406-512	Dual Notch	150	1-2	1-2	1-2	N(F)	PD696-3	211
406-512	UHF Mobile	50	5	1.2	1.2	BNC(F)	PD633A	208
406-512	UHF Mobile	50	10	0.8	0.8	BNC(F)	PD633A	208
406-512	UHF Mobile	50	5	1.4	1.4	BNC(F)	PD633A	208
430-470	Miniplexer P-R	50	5-10	1.5-1.2	1.5-1.2	BNC(F)	PD7660	213
470-512	Compact Base	65	3-5	1.7	1.7	N(F)	PD638-6-5	201
470-512	DuNotch/Hi Sel	250	3(Min)	1.0	1.0	N(F)	PD526-5	210
806-960	Dual Notch	100	3.6 or more	1.2	1.2	N(F)	PD896	211
816-866	HighSelectBP	400	45	1.5	1.5	N(F)	PD5043-8	215
824-894	ExpanSpectrum	500	14	1.0	1.0	N(F)	ExpanSpect.	217
824-894	ExpanSpectrum	500	25	1.0	1.0	N(F)	ExpanSpect.	217
825-890	HighSelec.BP	600	45	1.0	1.0	N(F)	PD5043-8	215
880-960	HighSelec.BP	600	55	1.0	1.0	N(F)	PD5043-8	215
896-960	Telemetry	50	24	1.0	1.0	BNC(F)	PD5079	218
896-960	Telemetry	50	24	1.0	1.0	BNC(F)	PD5078	218

RECEIVER MULTICOUPLERS

Receiver Multicouplers

Frequency Range	Rx Ports	Bandwidth MHz	NsFig dB	Gain dB	Order #	Page
66-88	4 - 64	1.0	7.9	1.0	RMC070-4	221
66-88	4 - 64	1.0	7.9	-0.5	RMC070-8	221
66-88	4 - 64	1.0	7.9	-0.5	RMC070-12	221
66-88	4 - 64	1.0	7.9	-0.5	RMC070-16	221
136-174	4 - 64	1.5	7.7	1.0	RMC150-4	221
136-174	4 - 64	1.5	7.7	-0.5	RMC150-8	221
136-174	4 - 64	1.5	7.7	-0.5	RMC150-12	221
136-174	4 - 64	1.5	7.7	-0.5	RMC150-16	221
406-450	4-64	6	5.5	2	RMC406-4	221
406-450	4-64	6	5.5	1	RMC406-8	221
406-450	4-64	6	5.5	1	RMC406-12	221
406-450	4-64	6	5.5	1	RMC406-16	221
450-512	4-64	6	5.5	2	RMC460-4	221
450-512	4-64	6	5.5	1	RMC460-8	221
450-512	4-64	6	5.5	1	RMC460-12	221
450-512	4-64	6	5.5	1	RMC460-16	221
806-824	2/24	15	5.5	14.0+19.5	RMC800-12A	228

Frequency Range	Rx Ports	Bandwidth MHz	NsFig dB	Gain dB	Order #	Page
806-824	12/24	15	5.5	14.0+19.5	RMC800-24A	228
806-824	10-24	15	4.5	26.5+19.5	RMC800-12K	228
806-824	10-24	15	4.5	26.5+19.5	RMC800-24K	228
806-824	4	15	4.0	5	RMC800-4N	230
806-824	8	15	4.0	2	RMC800-8N	230
806-824	4 - 64	15	4.5	12	RMC800-4	230
806-824	4 - 64	15	4.5	12	RMC800-8	230
806-824	4 - 64	15	4.5	12	RMC800-12	230
806-824	4 - 64	15	4.5	12	RMC800-16	230
806-824	4 - 64	15	4.5	12	RMC800-20	230
806-824	4 - 64	15	4.5	10	RMC800-24	232
806-824	4 - 64	15	4.5	10	RMC800-28	232
806-824	4 - 64	15	4.5	10	RMC800-32	232
806-824	4 - 64	15	4.5	7	RMC800-64	232
824-846.5	4 - 64	22.5	4.5	10	RMC836-32N2AV	224
824-846.5	4 - 64	22.5	4.8	10	RMC836-32N24V-8	224
824-846.5	8 - 64	22.5	4.8	26.5+19.5	RMC836-16K	226
824-849	8 - 64	25	4.8	26.5+19.5	RMC836C-16K	226
835-849	4 - 64	14	4.5	10	RMC842-32W24V	224
835-849	4 - 64	14	4.7	10	RMC842-32W24V8	224
835-849	8 - 64	14	4.8	26.5+19.5	RMC842-16K	226
890-915	10-24	6	4.5	26.5+19.5	RMC900-10K	228
890-915	10-24	6	4.5	26.5+19.5	RMC900-20K	228
890-915	4 - 64	6	4.9	13	RMC900-10	231
890-915	4 - 64	6	4.9	9.6	RMC900-20	231

Receiver Multicoupler Expansion Kits and Replacement Parts — See page 233

COMBINING PRODUCTS

Hybrid-Ferrite Transmitter Combiners

Frequency Range	Tx #Channels	Power-Max Per Channel	ISO Tx-Tx	ISO Ant-Tx	Ins Loss	Order #	Page
66-88	2	60	50	28	4.2	TBC078-2	237
66-88	2	100	50	28	4.2	TCC078-2	237
66-88	2	60	80	53	4.9	TBD078-2	237
66-88	2	100	80	53	4.9	TCD078-2	237
66-88	4	60	50	28	7.5	TBC078-4	237
66-88	4	100	50	28	7.5	TCC078-4	237
66-88	4	60	80	53	8.2	TBD078-4	237
66-88	4	100	80	53	8.2	TCD078-4	237
136-174	2	60	80	53	4.3	TBD150-2	237
136-174	2	125	50	28	3.9	TCC150-2	237
136-174	2	350	50	28	3.9	THC150-2	237
136-174	2	60	80	53	4.3	TBD150-2	237
136-174	2	125	80	53	4.3	TCD150-2	237
136-174	2	350	80	53	4.3	THD150-2	237
136-174	4	60	50	28	7.2	TBC150-4	237
136-174	4	125	50	28	7.2	TCC150-4	237
136-174	4	350	50	28	7.0	THC150-4	237
136-174	4	60	80	53	7.6	TBD150-4	237
136-174	4	125	80	53	7.6	TBD150-4	237
136-174	4	350	80	53	7.4	THD150-4	237
279-281	2	125	50	28	3.9	TCC280-2	237
279-281	2	125	80	53	4.3	TCD280-2	237
279-281	4	125	50	28	7.2	TCC280-2	237
279-281	4	125	80	53	7.6	TCD280-4	237
406-512	2	60	50	28	3.9	TBC460-2	240
406-512	2	125	50	28	3.9	TCC460-2	240
406-512	2	300	50	28	3.9	THC460-2	240
406-512	2	60	80	53	4.2	TBD460-2	240
406-512	2	125	80	53	4.2	TCD460-2	240
406-512	2	300	80	53	4.3	THD460-2	240
406-512	4	60	50	28	7.1	TBC460-4	240
406-512	4	125	50	28	7.1	TCC460-4	240
406-512	4	300	50	28	7.0	THC460-4	240
406-512	4	60	80	53	7.4	TBD460-4	240
406-512	4	125	80	53	7.4	TCD460-4	240
406-512	4	300	80	53	7.4	THD460-4	240
806-1000	2	60	50	28	3.9	TBC800-2	240
806-1000	2	150	50	28	3.9	TCC800-2	240
806-1000	2	300	50	28	3.8	THC800-2	240
806-1000	2	60	80	53	4.2	TBD800-22	240
806-1000	2	150	80	53	4.2	TCD800-2	240
806-1000	2	300	80	53	4.0	THD800-2	240
806-1000	4	60	50	28	7.1	TBC800-4	240
806-1000	4	150	50	28	7.1	TCC800-4	240
806-1000	4	300	50	28	7.0	THC800-4	240
806-1000	4	60	80	53	7.4	TBD800-4	240
806-1000	4	150	80	53	7.4	TCD800-4	240
806-1000	4	300	80	53	7.2	THD800-4	240
935-960	2	60	40	20	5.0	TH9021-1	244
925-960	1	40	48	23	2.0	TH9011-1	244
925-960	2	40	48	23	5.2	TH9021-2	244
1805-1980	1	45	-40	20	2.2	TH1811-1	262
1805-1980	2	45	-40	20	4.6	TH1821-1	262
1805-1980	4	45	-40	20	8.6	TH1841-1	262
1930-1990	2	45	-40	20	4.6	TH1921-1	262

Hybrid Ferrite Combiner Expansion Kits — See page 256

Cavity-Ferrite Transmitter Combiners

Frequency Range	Tx #Channels	Power-Max Per Channel	Min Sep	ISO Tx-Tx	ISO Ant-Tx	Ins Loss	Order #	Page
118-136	2	125	120KHz	35	25	2.4	TJC125-2	248
118-136	2	125	120KHz	60	50	2.8	TJD125-2	248
118-136	3	125	120KHz	35	25	2.5	TJC125-3	248
118-136	3	125	120KHz	60	50	2.9	TJD125-3	248
118-136	4	125	120KHz	35	25	2.6	TJC125-4	248
118-136	4	125	120KHz	60	50	3.0	TJD125-4	248
118-136	4	125	120KHz	35	25	2.7	TJC125-5	248
118-136	5	125	120KHz	60	50	3.1	TJD125-5	248
136-150	2	125	120KHz	35	25	2.4	TJC140-2	248
136-150	2	125	120KHz	60	50	2.8	TJD140-2	248
136-150	3	125	120KHz	35	25	2.5	TJC140-3	248
136-150	3	125	120KHz	60	50	2.9	TJD140-3	248
136-150	4	125	120KHz	35	25	2.6	TJC140-4	248
136-150	4	125	120KHz	60	50	3.0	TJD140-4	248
136-150	5	125	120KHz	35	25	2.7	TJC140-5	248
136-150	5	125	120KHz	60	50	3.1	TJD140-5	248
136-174	4	125	120KHz	85	75	3.6	TJT150-4	248
136-174	5	125	120KHz	35	25	2.7	TJC150-5	248
136-174	5	125	120KHz	60	50	3.1	TJD150-5	248
136-174	8	125	100KHz	35	25	3.5	TLC150-8	248
136-174	8	125	100KHz	60	50	3.9	TLD150-8	248
136-174	10	125	120KHz	35	25	3.4	TJC150-10	248
136-174	10	125	120KHz	60	50	3.8	TJD150-10	248
150-174	2	125	120KHz	35	25	2.4	TJC150-2	248
150-174	2	125	120KHz	60	50	2.8	TJD150-2	248
150-174	3	125	120KHz	35	25	2.5	TJC150-3	248
150-174	3	125	120KHz	60	50	2.9	TJD150-3	248
150-174	4	125	120KHz	35	25	2.6	TJC150-4	248
150-174	4	125	75KHz	35	25	3.1	TLC150-4	248
150-174	4	125	75KHz	35	25	3.1	TLC140-4	248
150-174	4	125	125KHz	38	25	3.1	TLC280-4	248
150-174	4	125	120KHz	60	50	3.0	TJD150-4	248
150-174	4	125	100KHz	60	50	3.5	TLD150-4	248
150-174	4	125	75KHz	60	50	3.5	TLD140-4	248
150-174	4	125	125KHz	63	50	3.5	TLD280-4	248
320-360	5	125	225KHz	35	25	3.15	TJC355-5	253

Frequency Range	Tx #Channels	Power-Max Per Channel	Min Sep	ISO Tx-Tx	ISO Ant-Tx	Ins Loss	Order #	Page
320-360	5	125	225KHz	60	50	3.5	TJD355-5	253
406-460	5	125	250KHz	35	25	3.4-2.7	TJC420-5	253
406-460	5	125	250KHz	60	50	3.8-3.1	TJD420-5	253
406-460	5	125	250KHz	35	25	3.4-2.7	TJC460-5	253
406-460	5	125	250KHz	60	50	3.8-3.1	TJD460-5	253
406-460	5	125	250KHz	85	75	4.3-3.6	TJT460-5	253
406-460	8	125	150KHz	35	25	3.4-3.0	TLC460-8	253
406-460	8	125	150KHz	60	50	3.8-3.4	TLD460-8	253
406-460	8	125	150KHz	60	50	3.8-3.4	TLT460-8	253
406-460	10	125	250KHz	35	25	3.8-3.1	TJC460-10	253
406-460	10	125	250KHz	60	50	4.2-3.5	TJD460-10	253
406-460	10	125	250KHz	85	75	4.7-4.0	TJT460-10	253
406-512	2	125	250KHz	35	25	3.1-2.8	TJC460-2	253
406-512	2	125	250KHz	60	50	3.5-3.2	TJD460-2	253
406-512	2	125	250KHz	85	75	3.9-3.6	TJT460-2	253
406-512	3	125	250KHz	35	25	3.2-2.7	TJC460-3	253
406-512	3	125	250KHz	60	50	3.6-3.1	TJD460-3	253
406-512	3	125	250KHz	85	75	4.0-3.5	TJT460-3	253
406-512	4	125	250KHz	35	25	3.3-2.8	TJC460-4	253
406-512	4	125	150KHz	35	25	2.9-2.5	TLC460-4	253
406-512	4	125	250KHz	60	50	3.7-3.27	TJD460-4	253
406-512	4	125	150KHz	60	50	3.3-2.9	TLD460-4	253
406-512	4	125	250KHz	85	75	4.2-3.7	TJT460-4	253
406-512	4	125	150KHz	85	75	3.7-3.3	TLT460-4	253
420-460	4	125	150KHz	35	25	2.9-2.5	TLC425-4	253
420-460	4	125	150KHz	60	50	3.3-2.9	TLD425-4	253

Cavity Ferrite Combiner Expansion Kits — See page 256

Waveguide Combiners

Frequency Range	Tx #Channels	Power-Max Per Channel	Min Sep	ISO Tx-Tx	ISO Ant-Tx	Ins Loss	Order #	Page
851-869	2	150	250KHz	64	50	2.9	WJD860-2	258
851-869	3	150	250KHz	64	50	3.1	WJD860-3	258
851-869	4	150	250KHz	64	50	3.2	WJD860-4	258
851-869	5	150	250KHz	64	50	3.3	WJD860-5	258
851-869	6	150	250KHz	64	50	3.4	WJD860-6	258
851-869	10	150	250KHz	64	50	3.6	WJD860-10	258
851-869	12	150	250KHz	64	50	3.8	WJD860-12	258
851-869	15	150	250KHz	64	50	4.4	WJD860-15	258
851-869	18	150	250KHz	64	50	4.6	WJD860-18	258
851-869	20	150	250KHz	64	50	5.0	WJD860-20	258
851-869	24	150	250KHz	64	50	5.0	WJD860-24	258
925-940	4	350	250KHz	64	50	3.3	SKD940-4	261
925-940	5	350	250KHz	64	50	3.5	SKD940-5	261

Compact Cellular Transmitter Combiners

Frequency Range	Tx #Channels	Power-Max Per Channel	Min Sep	ISO Tx-Tx	ISO Ant-Tx	Ins Loss	Order #	Page
851-960	4	70	630KHz	13	-	2.2	SM880-4	246
851-960	4	70	630KHz	38	25	2.5	SMC880-4	246
851-960	8	70	630KHz	13	-	2.5	SM880-8	246
851-960	8	70	630KHz	38	25	2.8	SMC880-8	246
851-960	12	70	630KHz	13	-	2.7	SM880-12	246
851-960	12	70	630KHz	38	25	3.0	SMC880-12	246
851-960	16	70	630KHz	13	-	2.9	SM880-16	246
851-960	16	70	630KHz	38	25	3.2	SMC880-16	246
935-960	4	45	600KHz	60	52	2.8	TI90-4	256
935-960	8	45	600KHz	60	52	3.4	TI90-8	256
935-960	12	45	600KHz	60	52	3.8	TI90-12	256
935-960	16	45	600KHz	60	52	4.2	TI90-16	256

High Power Cellular Combiners

Frequency Range	Tx #Channels	Power-Max Per Channel	Min Sep	ISO Tx-Tx	ISO Ant-Tx	Ins Loss	Order #	Page
869-894	4	200	0.63MHz	38	25	2.3	RSA880-4	245
869-894	8	200	0.63MHz	38	25	2.9	RSA880-8	245
869-894	12	200	0.63MHz	38	25	3.1	RSA880-12	245
869-894	16	200	0.63MHz	38	25	3.2	RSA880-16	245

RF AMPLIFIERS

Low Power, Class A Linear

Frequency Range	Gain	Noise Figure dB	Compress Point	Order #	Page
30-400	16.5	5-8	23	PF665	271
66-88	16.5	5.0	24	PF782	271
136-174	16.5	3.8	20	PF9208A	271
175-225	16.5	5.0	22	PF892B	271
406-512	16.5	4.5	24	PF829	271
406-512	18.5	2.8	20	PE869E	271
450-470	16	1.0	12	PF864A4	271
806-920	16.5	2.8	20	PF861E	271
806-920	26.5	2.8	24	PF833	271
806-920	10-32	208	23	PF805M	271
806-824	18.0	1.7	24	PF6456	271
824-849	16.0	1.0	12	PE849F	271

High Power, Class A Linear

Frequency Range	Gain	Noise Figure dB	Order #	Page
800-960	25	3.5	PA901	273
800-960	30	9.0	PA9142	273
800-960	32	7.0	PA9340	273
800-960	30	9.0	PA9341	273
800-960	8.5	N/A	PA9148	273
800-960	16	N/A	PA9144	273

Bi-Directional Amplifier Systems

Frequency Base Talk Out	Talk Back	Application	Order #	Page
851-869	806-824	SMR-full band	48510-N	263
851-869	806-824	SMR 5 MHz	48561-N	263
851-869	806-824	Public Safty 3 Mhz	48566-N	263
851-869	806-902	SMR 10 MHz	48569-N	263
935-941	824-846.5	900 MHz SMR-full band	48522-N	263
869-891.5	824-846.5	Basic Cellular A Band	48549-N	263
869-891.5	835-849	Enhanced Cellular A Band	48550-N	263
880-894	835-849	Basic Celluar B Band	48543-N	263
880-894	835-849	Enhanced Cellular B Band	48551-N	263

SYSTEM COMPONENTS

Power Divider Harnesses

Frequency	Size	Ports	Order #	Page
406-512	7.5x0.5 dia	2-way	PD10079	148
	6.5 x 0.5 dia	3-way	PD10075	148
	6.5 x 0.5 dia	4-way	PD10077	148
800-960	5.0 x 0.5 dia	2-way	PD10072	148
	4.0 x 0.5 dia	3-way	PD10076	148
	4.0 x 0.5	4-way	PD10078	148

Power Dividers

Frequency	Outputs	Isolation	Insertion Loss	Order #	Page
2-520	2	25	1.0	PD872	287
20-512	2	25	1.0	PD7724	287
20-512	4	25	1.5	PD7722	287
20-512	4	25	1.5	PD7725	287
20-512	8	25	2.0	PD7726	287
450-512	12	25	1.5	PD867A	287
800-960	2	25	0.6	PD8011	287
800-960	2	25	0.6	PD8913	287
800-960	4	25	0.8	PD7727	287
800-960	4	25	0.8	PD7848	287
800-960	6	25	0.6	PD861C	287
800-960	8	25	1.5	PD7849	287
806-821	10	25	1.5	PD834E	287
806-920	12	25	1.5	PD8413	287

PowerMonitors/Directional Couplers- See Page 285
System Cabinets and Accessories- See Page 289

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